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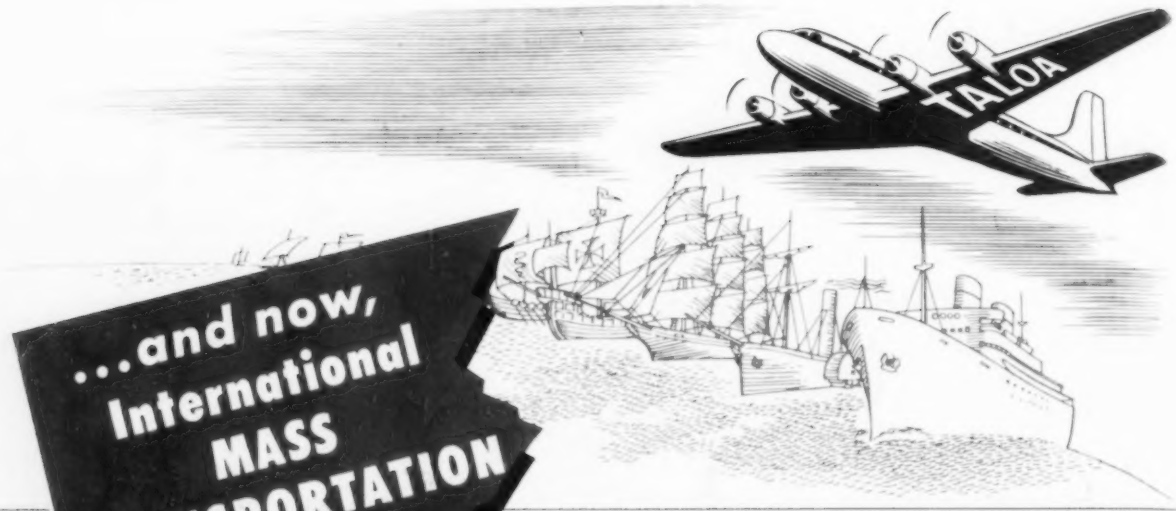

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Air to Ground!

U.S. Air Force Teamwork pays off!

"Tanks on road . . . map coordinates Easy Baker 46-51." The forward controller calls by radio to F-84 fighter bomber pilots supporting ground forces, pin-pointing the spot where air attack has been requested.

Screaming in from a long curve, the fighter bombers dive toward the target. Pilots touch firing switches . . . and the rockets slash groundward, each leaving its trail like a giant pencil mark under the fighter. The smoke column rises above the mauled target. Tactical pilots cooperate . . . hit hard . . . and ground forces move on. That is teamwork!

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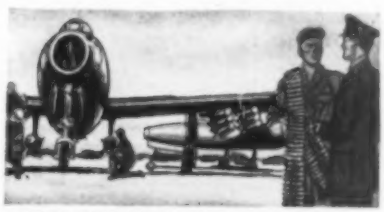
Your U. S. Air Force, in all its missions, works and fights as part of the Armed Forces defense team. That is the greatest teamwork of all.

U. S. AIR FORCE

FIGHTER-BOMBERS . . . F-84 jets . . . strike with rockets and napalm bombs, knock out column of tanks moving up against our ground forces . . . at Infantry's request.



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Special U.S. AIR FORCE Issue

Prepared in collaboration with the United States Air Force

MAY ★ 1951

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FLYING
VOLUME 48, NO. 5
MAY, 1951

Foreword

IN THE introduction to an earlier U. S. Army Air Forces issue of FLYING published during World War II, I wrote that "no one can now deny that the American military air establishment, together with its brothers of the U. S. Naval air arm and the Royal Air Force, has been the savior of our civilization." This was in October 1943. It did not occur to me then that in 1951, in an hour even more perilous to our future, I was again to write a foreword to a public account detailing the readiness of the new U. S. Air Force for war.

Americans are not a military people in the traditional sense of military organization for conquest. Our greatness lies rather in our magnificent industrial potential, our mechanical know-how, our enterprise, and the loyalty and sacrifice for principle of which free men are capable when the hour of absolute decision is at hand. The very symbol of that spirit and the expression of its power to triumph over every obstacle, is reflected in the American conquest of the air ocean. The average thoughtful American, seeing a world in which the peace and freedom of men is once more threatened by the tread of new Caesars and their legions of faceless men, takes immeasurable reassurance from the belief that the battle for air power has been won. He sees what seems abundantly clear, that our nation will be unable to fulfill the mission which is developing out of the conditions of this century without a great air armada able to deliver a retaliatory blow of such staggering proportions as to restrain any international lawbreaker likely to risk an open fracture of the peace.

Yet the struggle for air power is far from over. It will not be won until the major portion of our national potential for war has been channeled into a fully self-contained air arm, capable of loyal cooperation with the other armed services, but capable also of forcing decision on its own if necessary.

Today again, as in the confusing days before our physical entry into World War II, the cry has gone up for limitations on the strength of the air arm, in favor of the so-called fighting team.

There is no tradition in military affairs more glorious than that which surrounds the courage and triumphs of the American footsoldier. But today, in the presence of an implacable enemy, overwhelmingly powerful in guns, armor and men, and enjoying a superior position in space as well as internal lines of supply, is not the American footslogger's day. The conditions do not recommend themselves either to the transportation of men and materiel over great distances against so formidable an enemy, nor to the diversion of our resources to far-off battlefields not of our own choosing.

However reluctantly the older services may view the matter, the battle of wills and arms which threatens may only be brought to successful conclusion by a vertical envelopment of the cities, supply lines and vital industrial areas of our grim adversary. These conditions cannot be met unless the major striking power of our nation is concentrated in the United States Air Force and its auxiliaries. Wherever the battle is joined, the U. S. Navy and the U. S. Ground Forces will play a brilliant and necessary part, but the decisive power by which wars are either to be won or prevented altogether can lie only in the creation of an all-powerful air arm. Only here can we secure the fullest advantage from our superior intelligence, know-how, industrial strength and geographical position.

On the pages which follow is an authoritative account as detailed and comprehensive as the conditions of security will allow, of the machines, the operational program, and the strategic blueprint by which the air defenses of this nation are to be secured.

This is a story which must give comfort and assurance to every American. It is the story of the new Air Force which has risen steel-thewed out of the dissolution and impotence to which the once invincible American war machine had sunk when after the military defeat of Germany and Japan our nation turned with a hopeful heart to the promise of a long peace. To the Honorable Thomas K. Finletter, to General Hoyt S. Vandenberg, to the members of the Air Staff and the officers of the various commands, and to the other Air Force personnel under whose direction this material has been prepared, I make grateful acknowledgment, a salute in which I am certain all Americans who read these pages will join me.

William B. Ziff

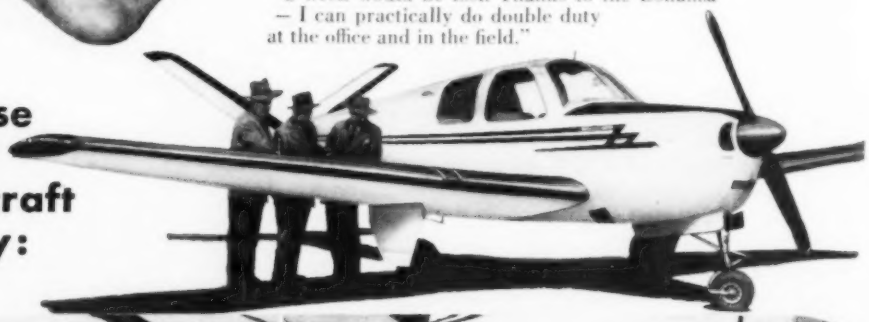
William B. Ziff
Publisher of FLYING

"R. D. Ezell must be twins!"

So say branch managers about the executive vice president and general manager of the Roy C. Whayne Supply Co. at Louisville. It's because Mr. Ezell really gets around since his company acquired a Beechcraft Bonanza.

The Whayne Supply Co. operates a huge road machinery business, with branches in Evansville, Indiana; Ashland and Paducah, Kentucky, so plenty of field trips are needed. "The Bonanza is a marvelous engineering achievement — completely dependable, rugged, and fast. I make this trip to all three branches and am away from Louisville only one night. By other means of transportation a week would be lost. Thanks to the Bonanza — I can practically do double duty at the office and in the field."

Check these reasons for Beechcraft superiority:



A ROOM APLENTY for four big men in the spacious cabin. Front seats even more comfortable; new two-position reclining rear seat. Color and upholstery styling all new, too.

B SAFETY—RUGGEDNESS. Low, cross-braced landing gear is wide and long. Rough landings are smoothed. In flight you cruise, using only 65% of the engine's rated take-off power. *Extra* safety margin!

C SPEED and top performance. Take-off horsepower now 205 at 2,600 rpm; new Beechcraft metal propeller has greater aerodynamic efficiency. Short fields no problem! And there's greater economy in fuel consumption, too.

- For full details on the new Model C35 Bonanza, see your Beechcraft distributor, or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.
- Higher top speed: 190 mph
- Higher cruising speed: 175 mph
- Longer range: 775 miles
- Better fuel economy: 19.9 mpg

Beechcraft

BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Introduction

THE Air Force is occupied today with vitally important tasks. As a strong arm of the defense team we must be as powerful as possible to serve as a deterrent to aggression from any source. We must at the same time be building an Air Force which will be strong enough to win the victory over any aggressor should war come in spite of our most earnest efforts.

The Air Force is built around three fighting commands. They are namely: the Strategic Air Command which, with its long range bombers, is such a potent deterrent to aggression; the Air Defense Command which, with radar and interceptors, seeks to protect us against air attack; and the Tactical Air Command which will provide air support for surface forces in the event of a war. In addition, of course, the Air Force includes overseas commands and supporting commands within the United States.

This issue of FLYING Magazine tells in detail of the background of the combat commands, the supporting commands, and the specialized agencies of the Air Force. While a certain amount of information is not available because of military security, I feel that the stories as presented form an interesting and valuable recital of the bits and pieces that make up the Air Force today.

As I have said, a primary purpose of our military force is to prevent war. As has been pointed out by military leaders many times, the long range Strategic Air Command is probably the greatest deterrent to aggression in the world today. This makes its maintenance and improvement of cardinal importance to the future, not only of our nation but of the free world. To state this is not to minimize the importance of other commands but only to recognize an obvious basic fact.

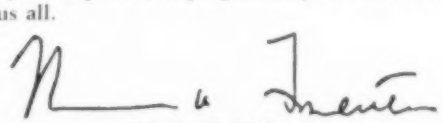
The Air Force is exceedingly aware of the high importance of its Air Defense Command. With the development of atomic weapons by other nations it has become even more important that we do all that we can to make our defense against air attacks as good as possible. We are doing just that, even with the sober realization that the best we can do will not completely stop any concerted air attack against our nation. Our job—our air defense job—as we see it, is to bring down as many enemy bombers as possible so as to blunt the attack and try to insure that we will still be able to get our strategic air force into action against the source of the enemy's attack.

The build-up in the ground forces in the United States and other free world countries has led to a new emphasis on tactical air. Tactical air, of course, is of value only when there are ground forces which it can support. Now that our ground forces are being built up, tactical air is being increased correspondingly. The Air Force realizes fully that we must be prepared to win the air battle, complete the cutting off of supplies and men from the battlefield, which is the interdiction function, as well as to give the close support to the ground troops as a sort of super-artillery in the event war still should come.

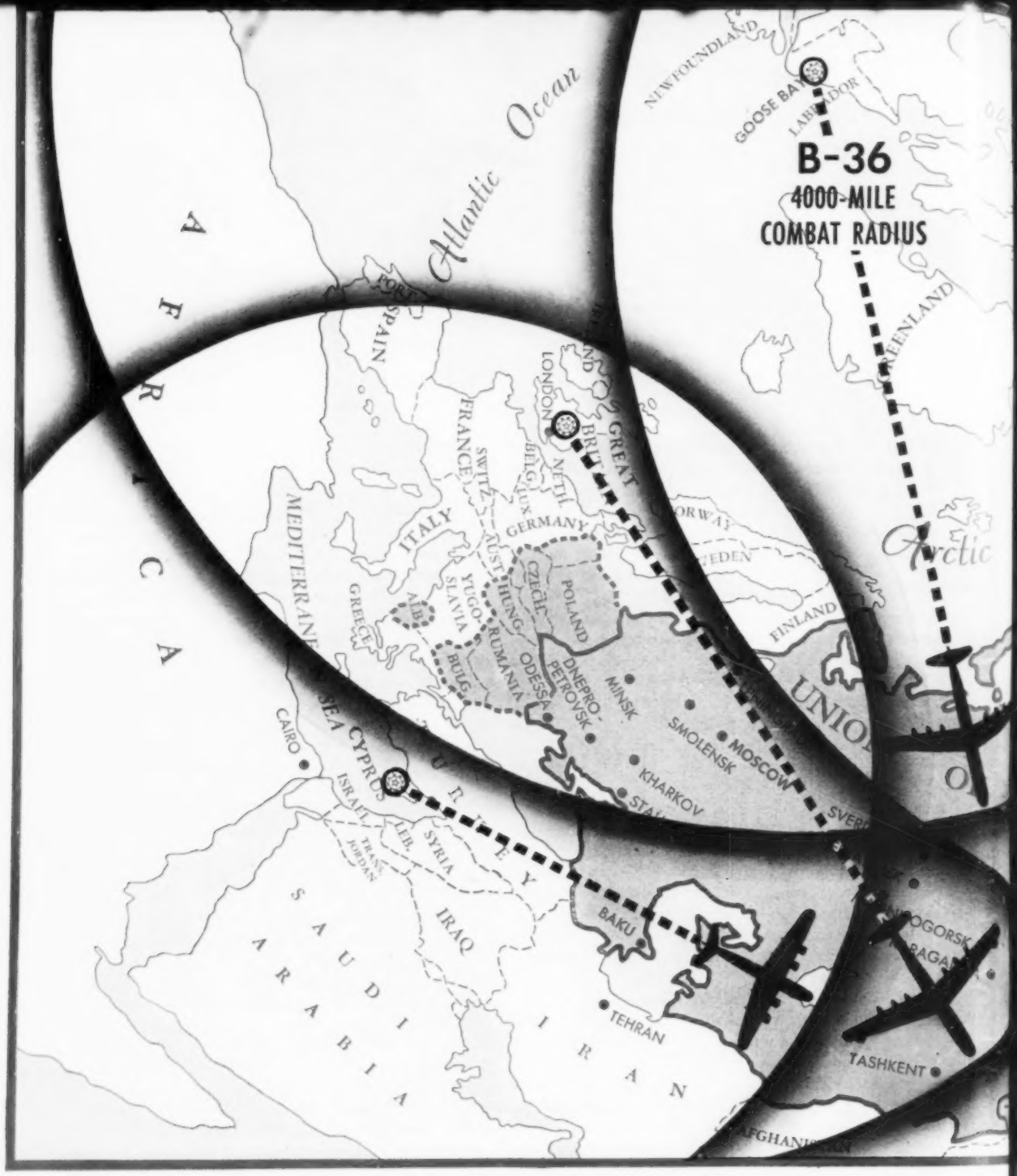
These major fighting commands and all other subordinate units in the Air Force are being strengthened and improved. Inconsistent as it may seem, we are building this improved force as our primary hope for peace—and as a guarantee of victory should peace prove unattainable.

The Air Force is trying to do these things as quickly as possible while at the same time making every effort to obtain the maximum efficiency from the funds it receives to fulfill its missions. The Air Force is determined that the tax dollars of American citizens shall obtain the greatest possible amount of good for the American people and the free world. While the modern weapons of today cost what may seem like fantastic sums, the Air Force feels that it would be guilty if it stood the risk of running behind in the race of technical superiority and did not obtain them. We feel that we must keep apace and more than apace with any aggressor power or the consequences may be fatal.

The Air Force is pledged to the best performance it knows how in the various fields which are listed in the many separate articles in this issue. The Air Force is pledged to this effective performance so that it may do its part in helping attain peace and security for us all.



Thomas K. Finletter
Secretary of the Air Force



U.S. Air Power AND World Strategy

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NO ARGUMENT short of an actual demonstration can dramatize the striking potential of the U. S. Air Force as well as can a map of key portions of the northern hemisphere.

This is such a map, prepared for the editors of FLYING, with superimposed color to show the striking distances of two U. S. operational strategic bombers. Though the map is theoretical, it is based upon known performance of the 10-engined Convair B-36 and the four-engined Boeing B-50. The ranges are especially conservative as they don't allow for advanced refueling techniques which give enormously greater range to the strategic bombers.

FLYING's editors assume that B-36's can operate from Goose Bay, Labrador; Fairbanks, Alaska; and from Eng-

land. They assume, furthermore, that B-50's can fly from Cyprus and Japan. The assumption is purely arbitrary, because both planes might be able to operate from all five locations—as well as from a good many others even more favorably situated. These bases were selected because they are reasonable sites, and because they are all protected by ocean from the land might of Russia.

The map dramatizes the fact that by the most conservative calculation B-50's based on Cyprus can cover the entire Middle East, the rich oil fields of south Russia and Romania, and most of Russia's best industrial areas. The B-36's in England could cover that entire area plus an even larger portion of the Siberian industrial complexes. From Fairbanks, B-36's could range over northern Russia and most of Siberia but would not be able to damage critically European Russia's industrial potential. They could control the industrial areas of the Soviet Far East, though not as economically as B-50's based upon Japan.

A further fact is also clear. If the B-36 were confined to North American bases, even its 10,000-mile announced range is not sufficient to hit a major portion of the Soviet's industrial power. Bases closer to the scene of action seem absolutely essential, for B-50's based on Cyprus can blanket a much larger industrial area in densely-populated Russia proper than can even B-36's based on Goose Bay.

These dramatic facts are the key to today's world political struggle.

—THE EDITORS

☆

U.S. air power is on the march. For the third time in history the Air Force is undergoing a tremendous build-up of strength.

☆

THIS IS

Your New Air Force

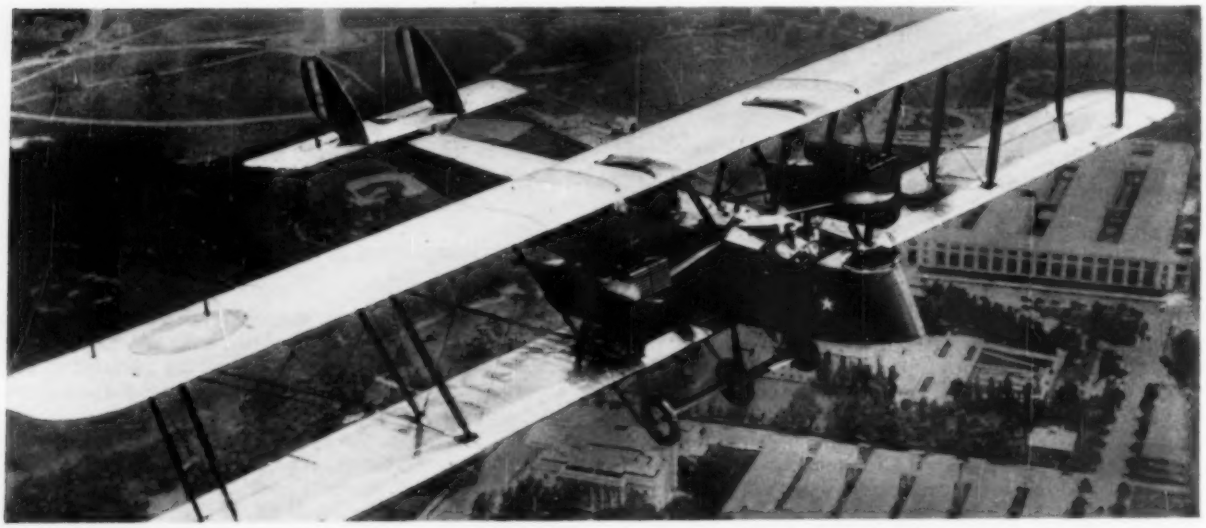
By Gen. Hoyt S. Vandenberg

Chief of Staff, United States Air Force

AS THIS ISSUE of FLYING goes to press, the National Defense Establishment is building beyond any peacetime goals. Current Air Force procurement of personnel and equipment is directed toward a goal of more than double the strength of the Air Force at the beginning of the Korean conflict.

The Air Force recognizes that air superiority over enemy nations cannot alone win a war, though loss of air superiority could lose it. Total victory in modern war is the product of ground, air and sea power. Nothing can be gained, everything will be lost, if one component is sacrificed to such a point that it is unable to contribute to the big objective.

Trying to evaluate the lessons of airpower in Korea for guidance in an uncertain future we are struck at the outset by the fact that enemy air opposition has



YESTERDAY Obsolete now, but even in the '20's the Martin twin-engined bomber gave the Air Force striking power. A similar bomber—the MB-2—was used by Billy Mitchell in 1922 to sink the battleships off the Virginia capes.

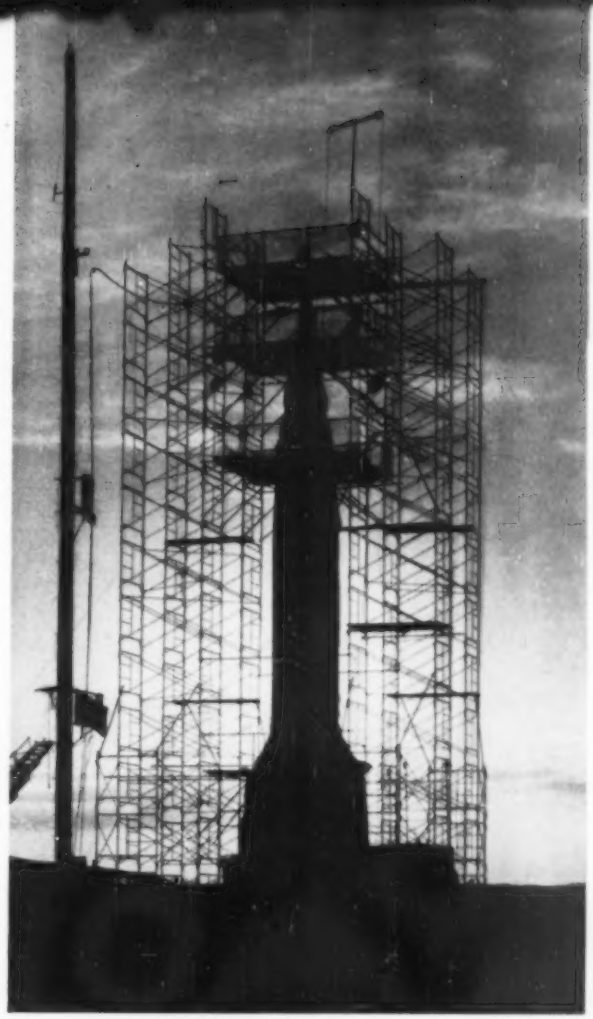
been almost totally lacking. Our new jet aircraft performed in a manner that indicates their superiority for every conceivable job demanded of a fighter plane. The jet is an all-purpose plane that can do everything better than a piston type, including close support.

Air power alone doesn't guarantee America's security but it exploits the nation's greatest asset—our technological skill. We cannot hope to match enemy nations in manpower but we can, as in the last war, produce more and better airplanes than other countries. And we have young men with the mechanical facility for flying all the planes we build. Training can quickly give them proficiency.

In the present state of world affairs, specific figures indicating our air strength cannot be given. But the American people can be assured that the United States Air Force is prepared to carry out those missions of air transport, strategic counter-attack and tactical support of Army and Navy which the security of the United States demands.

When the United States entered World War I, little had been done toward giving the Aviation Section of the Army's Signal Corps either adequate equipment or trained personnel. Nothing resembling a modern air force had been created. By Act of July 24, 1917, Congress authorized an increase in personnel and appropriated $640,000,000 for procurement of aircraft and support. The Aviation Section then expanded rapidly, growing from a personnel strength of 78 pilots, 53 other officers and 1,120 enlisted men in seven squadrons in April, 1917, to a strength of 20,000 officers, 600 cadets, and 164,000 enlisted men in seven squadrons in November, 1918. The United States Air Force of today is a direct development from that organization.

In its only previous combat operation, in connection with the Punitive Expedition into Mexico in 1917, the performance of the Aviation Section had been a



TOMORROW Guided missiles may replace the big bombers of today. Here, V-2 missile can fly 3,000 m.p.h. and give boost to step rocket in nose which reaches undisclosed greater speeds.

TODAY Bombers have gone intercontinental. The 10-engined B-36 was designed to attack European targets from U.S. bases. Today the atom bomb has given unimaginably greater power to this plane that can carry bomb 10,000 miles non-stop.

Two Key Figures
In the Growth of U.S. Air Power

Brig. Gen. William (Billy) Mitchell was one of first to see necessity of air power, laid foundations for modern Air Force in famous bombing tests on battleships in 1922.

The late H. H. (Hap) Arnold, General of the Air Force, built U.S. air power from a few men and planes to the huge force that helped defeat the Germans and Japanese.

dismal failure. In World War I, aviation won few notable combat victories, although a force of 1,481 planes—American, British and French—under the command of Col. William L. ("Billy") Mitchell took an indecisive part in the St. Mihiel offensive of September, 1918. However, aviation served successfully as the "eyes of the armies" when hostilities deteriorated into the long stalemate of trench warfare. World War I gave early training to future air leaders and revealed the potentialities of aviation for strategic as well as tactical reconnaissance. Furthermore it hastened the technical developments of aeronautics and pointed the way to the future use of air power in strategic bombardment.

The Army Reorganization Act of June 4, 1920, established the renamed "Air Service" as a separate and coordinate arm of the Army with an authorized strength of 1,516 officers and 16,000 enlisted men. The Air Service now concentrated on the progressive development and perfecting of planes and engines built according to new and better designs. Notable records for distance, speed and endurance where achieved.

The Air Corps Act of July 2, 1926, gave the Air Service a new name and by provisions affecting personnel and procurement sought "to provide more effectively for the national defense by increasing the efficiency of the Air Corps." On June 20, 1941, the Army Air Forces was established and—particularly as a result of a reorganization announced March 2, 1942—achieved *de facto* autonomy. For all practical purposes the AAF absorbed the Army Air Corps. Army Field Manual 100-20, dated July 21, 1943, stated unequivocally the now accepted fundamental doctrine of air power; "land power and air power are co-equal and interdependent forces: neither is an auxiliary of the other."

World War II saw the demonstration of this doctrine and the maturing of the strategic concept of air power. Tactical air power cooperated with the Army and the Navy to win victories in the invasion of North Africa by American forces in November, 1942, as it was to do in the invasion of Normandy and the continent of Europe in the summer of 1944.

Independent action of the AAF (in cooperation with the RAF) in long-range, strategic bombardment (chiefly by B-17's), did much to destroy and dislocate the German military, industrial, and economic system, and to undermine the morale of the German people to the point where their capacity for armed resistance was fatally weakened. Particularly notable was the destruction of the German fighter defense, beginning in July, 1943. This attack culminated in the "Big Week" of February 20, 1944, when six days of perfect flying weather permitted a continuous assault on the widely-dispersed German airframe factories and assembly plants. The German aircraft industry never fully recovered from the blow and the Allies controlled the air over Europe during the remaining 14 months of the war.

In the Pacific, the AAF won its initial victories in the China-Burma-India theater, giving substantial protection against enemy air power and disrupting Japanese shipping and railways. It transported men and supplies for all our forces, and its flight from bases in India over the "Hump" of the Himalayas to China performed a logistic air feat, previously unparalleled, that kept China in the war. Cooperating with Navy and Marine air forces, it assured air superiority in the push toward Okinawa. Finally on August 5 and 9, 1945, B-29's dropped single atomic bombs on Hiroshima and Nagasaki.

After the surrender of Japan the AAF shrank rapidly from its wartime peak of 2,400,000 men and officers and 80,000 planes to a low point (in May, 1947) of 303,614 military personnel. Hasty demobilization weakened the training facilities of the Air Force and reduced it to such a low state of operational efficiency that there was deep concern for its capabilities.

The major effort of the Air Force was to recover efficiency. But the Air Force anticipated the eventual enactment of legislation to establish an autonomous Air Force within a unified defense establishment and took heed of lessons learned during the war. It reorganized its structure into functional commands designed to replace the previous organization based on geographical or area responsibility, or on the type of aircraft employed. The command structure and the Headquarters organization that became effective June 11, 1946, were retained when autonomy was achieved and the United States Air Force came into existence on September (*Continued on page* 164)

In Korea, rugged North American F-86 proved only Western jet able to outfly speedy Russian Mig-15's.

Newest Thunderjet, sweptwing Republic F-84F now in production, fires eight of its five-inch rockets in train.

Two engines on mammoth B-36D intercontinental bomber give top speed of 435 m.p.h. Plane grosses over 179 tons.

STRATEGIC AIR COMMAND

THE A-BOMB FLEET

The mission is clear: destroy an enemy's industrial ability to make war. The Air Force's strategic theory and main effort are devoted to solving this one problem.

THE second officer on a freighter ten days out of Hong Kong bound for South America noticed a thin white vapor trail in the sky. Through powerful binoculars he could see that the white line was streaming from a large four-engined bomber. He wondered idly why a bomber should be so far off the beaten path, then made an entry in his log and dismissed the matter from his mind.

At about the same time an Arab, shielding his eyes against the glare of the African sun, searched the sky in vain for the source of a distant throbbing drone. He was nervous, for he could feel its power vibrating the ground beneath his feet.

At that moment, on the opposite side of the globe above the 48th parallel, the keeper of an Arctic weather station who happened to be a former Air Force navigator, listened intently for a moment, then rushed outside to search the cold night sky. He could see nothing but he smiled in reminiscence as he recalled his service in World War II. He knew what the second officer of that freighter and the lone Arab didn't know—that a bomber of the United States Air Force's Strategic Air Command was winging overhead.

He knew that in the plane a navigator crouched over a chart board calculating drift and ground speed and giving course corrections to the bomber's pilot. He knew that every few minutes the navigator would squeeze past a gun turret and enter the astrodome where he could take star shots to check his calculations.

What the weatherman probably did not know was that the navigator in that airplane and the 12 other men of its crew had flown together for the past three years. During that period the crew had been welded into an intensively-trained and highly skilled combat team that could produce navigational and bombing results far more accurate than any that his own crew ever had achieved back in 1945.

Up there in the big bomber the navigator had been the first man to spot the tiny pin-point of light that marked the weather station. It told him that he was on course and only 30 seconds off ETA (Estimated Time of Arrival)—an acceptable error. The navigator made a few rapid calculations on a piece of paper and passed it to the pilot. He had written: "On course. Target at four zero past the hour. Outside temperature, —60°."

Far below, the jagged, snow-clad mountains gave way to icefields and broken patches of open water. Shortly the plane was flying in clouds. The fluorescent glow of cockpit lights was reflected from windows that had been transformed into panels of solid impenetrable white. The navigator might as well

A B-29 is made ready for overseas movement in a few hours. Equipment and crews can all be carried in the plane, ready for operation on arrival. On far side of nose is spare engine and other equipment carried in bomb bays. In front of flight crew (foreground) are brief cases, equipment, papers, personal baggage, helmets, oxygen masks, anti-exposure suits, life vests and parachutes. Behind flight crew is maintenance crew.

Bombing up a SAC B-29 named "Spirit of Freeport," at a Far East Air Force base. Plane is from one of several SAC groups assigned for action against North Koreans.

have been in a submarine for all he could see of the stars or the earth. But another member of the bomber's crew immediately took over the navigating job. He could see when others couldn't for he was the radar operator. Upon his electronic vision cloud and darkness had no effect.

As the aircraft bored into the weather, ice formed on the propellers and hail bombarded the plane's nose and wings. But, peering intently into his scope, the radar operator unerringly plotted the bomber's course over the ground and continued to pass his directions along to the pilot.

At three seven past the hour, the radar operator watched the target area creep into the edge of his radarscope. The bomber began its run. . . . After "Bombs Away," the aircraft swung in a gentle turn, the navigator set the course for home, and 12 hours later the pilot put his plane down on the airstrip.

The bomber that the Arab had heard but couldn't see already was on the ground. Three hours earlier it had descended through a swirling fog, guided by GCA (Ground Control Approach), at its training base in England. Over the Pacific, the B-50 that the ships' officer had followed with his binoculars was winging back from its target toward a small island base, still several hours' flying time away.

These were only three of the many bombers flying similar training missions that day over the United States and far-distant parts of the globe. These bombers of the Strategic Air Command were engaged in routine peacetime operations—that of maintaining proficiency for possible global war.

In the words of the Commanding General of the Strategic Air Command, Lieut. Gen. Curtis LeMay, there is no such thing as partial readiness. "When

the bell rings," he says, "either you are ready—or you are not."

Ready for what?

In brief, ready to defend the United States and its citizens against possible attack by an aggressor nation. This defense may best be achieved by an aerial combination of the two basic elements of warfare since time immemorial—defense and attack.

The air defense of the United States, in a narrow sense, means the warding off of aerial blows—the shooting down of bomb-carrying aircraft before they have crossed our boundaries, while they are in the air over our cities, or—last and most ineffectively—after they have dropped their cargos of destruction.

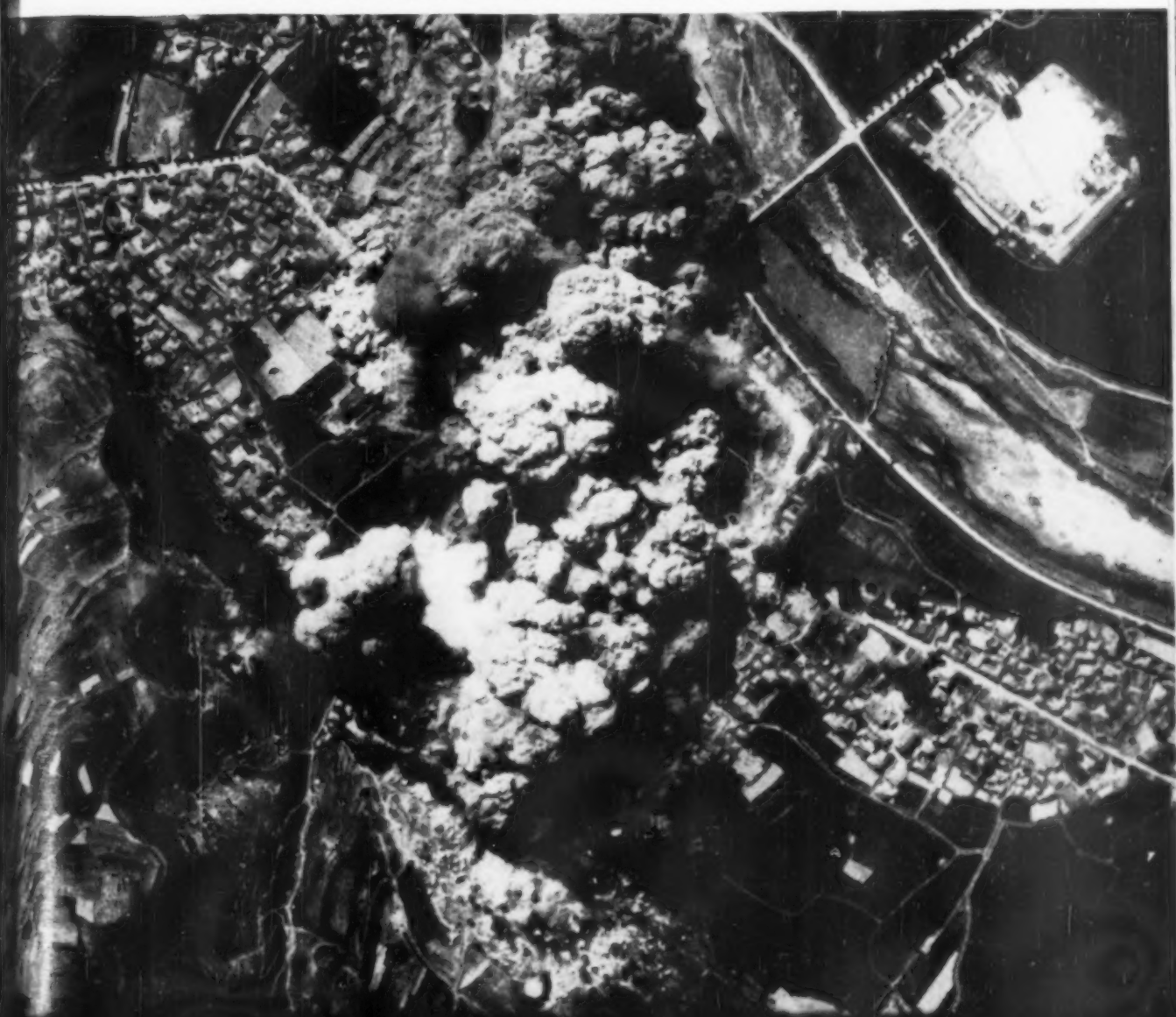
Such purely "defensive" protection is not enough, Gen. Hoyt S. Vandenberg, Chief of Staff, U. S. Air Force, in a recent study of combat air effectiveness said: "Should war come—we can be expected to destroy no more than 30 per cent of the planes making an attack in strength on the United States before their bombing missions are completed." If some 450 long-range enemy bombers were to cross our land and sea frontiers an estimated 70 percent of them, according to an officer in the best position to judge, "would penetrate our defenses despite the valor and skill of our pilots."

If we as a nation were to rest content with a Maginot Line strategy composed of radar warning nets, antiaircraft artillery and defensive fighter planes we would face the prospect of having hundreds of bombers get through to drop their loads of death and destruction.

That such a defense alone is not enough is obvious at once. That is why the Air Force Chief of Staff and the Joint Chiefs of Staff have endorsed the age-old basic principle of warfare that the best form of defense is attack; that it is not enough merely to ward off blows but to take powerful counter measures.

To win any fight, attack rather than defense is the necessary ingredient—on the ground, at sea, and in the air. (*Continued on page* 146)

End of a strategic objective. B-29 operating in Korean theater has dropped its bombs squarely upon a group of warehouses at Samga, Korea. The B-29 Superfort, though considered obsolescent, is still in wide use with Strategic Air Command.



OPERATIONS

Air Force Quarterback

Operations must keep our planes ready to fight anyone, anywhere and anytime.

DURING the early stages of the Korean War the U. S. Air Force used the F-80 (*Shooting Star*) as one of its main weapons in air-ground warfare. The *Shooting Star* displayed an admirable ruggedness and adaptability in these operations for which it was never intended, and was more than a match for the Yak-9 and other Communist planes encountered.

But before long the Communists threw into the battle the Russian-built jet Mig-15, a plane that is considerably faster than the F-80. The *Shooting Star* was outclassed by the new Russian fighter. Migs could attack at will the slower American fighters like the F-51 and F-82 and, because of their speed, could break off combat at will with the F-80. The Migs would fight when they considered that they had the advantage but when things got too hot for them they would simply open their throttles and speed over the Yalu River into the Manchurian sanctuary.

After studying this kind of hit-and-run-home warfare, Lieut. Gen. George E. Stratemeyer, commanding general of the Far East Air Forces, dispatched a report on the situation to General MacArthur and a similar report to the Air Force Chief of Staff, Gen. Hoyt Vandenberg. General

Complexity of operational job is indicated by the picture above. Forty-three men, 21,116 gallons of gasoline and 1,200 gallons of oil are required to keep one plane—a B-36—in the air. Deputy Chief of Staff, Operations, must keep thousands of planes flying and ready for combat in case of war.

Vandenberg immediately turned the problem over to Lieut. Gen. I. H. Edwards, Deputy Chief of Staff, Operations (DCS/O).

The DCS/O called a conference of his staff and within 24 hours help for General Stratemeyer's FEAF was planned and the plans were being put into motion.

A few weeks later the fastest jet fighter presently operational in the USAF, the F-86 (*Sabre*), roared into the Korean battle. Against the fast and powerful *Sabres* the Migs put up less and less opposition. The Communist fighter pilots changed their slogan from "Up and at 'em," to "Manchuria, here I come."

For the time being, at least, all was well with the Far East Air Forces.

That was what happened. One wing equipped with America's fastest jet fighters had moved speedily to a battlefront halfway around the world. A major military problem had arisen and been solved. The job was accomplished by the Air Force's "quarterback," the Deputy Chief of Staff, Operations.

The higher strategy of war seems complicated. But actually it is a matter of common sense, plus a little foresight and imagination. Obviously our defense forces cannot be everywhere. We haven't enough airplanes to go around. So we must be able to move them where they are needed.

When the DCS/O received the order to send F-86's to Korea, he and his staff immediately began to study all the factors involved. There probably was little or no hesitation in deciding on the most desirable plane. An F-86 had set a world speed record for combat aircraft in 1948 by flying at a speed of 670.981 m.p.h. It was the logical choice for the job. But this was only the beginning of the problem.

Planning an operational movement is highly involved. Sending the F-86 wing to Korea entailed the following procedure: the wing had to be chosen from the stateside units; it was alerted to move along with its supporting elements, communications group, maintenance personnel, supply and transport groups.

During the action in Korea some of these men unfortunately will be killed, wounded or missing in action, while others will be incapacitated by illness. Therefore, the moment the groups start out, (*Continued on page* 173)

Friendly jets. Air Force F-86's, are spotted by civilian lookouts in Connecticut. Warning system in north and coastal U.S. contains 20,000 posts.

AIR DEFENSE COMMAND

How We Plan to Stop the Bombers

Fast jet interceptors are poised near vital U. S. cities to protect nation against sneak air attacks.

IT'S QUITE LIKELY that the next war will be declared, not in polite diplomatic phraseology handed to our State Department, but stealthily during hours of darkness in terms of "blips" on a radar scope.

The radar scope may be lodged in a lonely outpost on some barren mountain top along the outer fringe of the U. S. radar net. It might even be within the warm interior of a Navy picket submarine under the North Atlantic, the Pacific or the Arctic oceans, with the radar antenna whirling above the dark, foam-flecked waves.

The radar operator—whoever and wherever he may be—will adjust the controls instantly and delicately, tuning his set for the best reception. The "blips" will indicate enemy airplanes.

And undoubtedly the enemy planes will be carrying atom bombs.

The Air Defense Command is charged with the responsibility of guarding the United States against this form of attack.

To do this, the ADC has to be ready for attack from

Volunteer spotters report unidentified plane during recent test exercise. They send data to filter center.

A hostile plane? Radar operator at Ground Control Intercept station plots path of unidentified aircraft. Fighters may be "scrambled" to intercept strange plane.

No time to waste, pilots race toward F-86's on snow-covered base following "scramble" order from GCI controller.

Busy ADCC (Air Defense Control Center) is responsible for an entire region. It tracks all planes in region; would warn cities of raids.

any quarter. The Canadian border is some 3,000 miles long in a straight line—3,900 miles if you follow all its twists and turns. The Mexican border is 1,975 miles long; the ocean, lake and river borders some 10,000 miles more. The border between Canada and Alaska stretches an additional 1,539 miles.

But these are only political and geographic boundaries over which aircraft may pass in a fleeting moment. They are not walls. Within these borders are over 3,000,000 square miles of U. S. territory, with nearly 4,000,000 more square miles within the boundaries of Canada.

Over this area, unless they are opposed and driven off or destroyed, enemy bombers may roam, seeking out and bombing countless industrial, financial and agricultural areas.

Time, obviously, is the essence of the interception problem. The ADC has at best hours, and perhaps only minutes and seconds, to stop the invader air forces before they drop their bombs.

Gen. Hoyt Vandenberg, Air Force chief of staff, said recently: "Should war come, we (*Continued on page* 174)

Front Line Air Force

Infantrymen dash for cover as a Shooting Star makes low-altitude 'strafing run' during tactical maneuvers near Vilseck, Germany.

Wingtip tanks are modified at an air base in Japan. Expendable tanks give greater range to fuel-gulping jet fighters.

Ball of fire rises over North Korean barracks after napalm bomb is dropped by a B-26. Seconds later building was gutted.

TACTICAL AIR COMMAND

Today in Korea, UN infantrymen are getting the best tactical air support in aviation history.

TACTICAL air power as we understand it today was unknown before World War II. It wasn't until the German sweep through Poland, the Lowlands and France in 1939 and 1940 that air power became a considered factor in ground operations.

When the German blitzkrieg stabbed through Europe, overwhelming all opposition, Allied military leaders became acutely aware of the value of air weapons. Because of the early German successes with the *Stuka* support plane, military minds were strongly in favor of adopting the German concept of tactical air power. But it was soon realized that there was a basic error in German planning. The *Stuka* had been successful in its operations because it had never faced determined air opposition. The German general staff had not considered air superiority in planning its tactical air arm.

The *Luftwaffe* doctrine allowed its planes to be parceled out to surface units. They were subject to the complete control and exploitation of ground commanders. But in the development of Allied air power another theory prevailed. Allied tactical air forces were centrally controlled and applied in mass. In this way the Allies were able to gain control of the air over the battlefield and to destroy enemy air units.

The difference of these two concepts was illustrated in the North African campaign. The Germans devoted their air resources to direct support of the surface armies with a complete disregard to isolating the immediate battle area by interdiction tactics. The *Luftwaffe's* limited view of the bigger and over-all picture allowed the Allied armies to accumulate the necessary supplies and equipment for an all-out effort at a later date.

Conversely, under the leadership of Field Marshal Montgomery and Air Marshal Cunningham, Allied tactical air power was used to gain air superiority over the battle area so that the ground campaign might progress rapidly without unnecessary loss of life and equipment. On the Western Desert, the British Royal Air Force based its plans on the realization that air superiority must be established and maintained before a major ground campaign could be launched with any reasonable assurance of success.

The RAF further recognized that tactical air power should constitute a separate and distinct force, coequal and independent of the surface force. This view of air power was entirely new and different, and a big step toward the concept as it is known and employed today in the U. S. Air Force.

From the lessons learned in North Africa and later campaigns, the U. S. Air Force built an effective tactical arm which was instrumental in forcing the Germans out of Italy, across France and deep into Germany itself.

At the close of World War II, the tactical air force of the AAF was greatly reduced. But further development of weapons and techniques continued under the Tactical Air Command which was activated in 1946 at Langley AFB, Va., as a major command.

For a year, from December, 1949, until December, 1950, TAC was organized as a streamlined operational

Republic F-84 Thunderjets, operating in Korea, roar off the runway loaded with five-inch rockets for close support mission.

headquarters under the Continental Air Command. But when the recent expansion program of the Armed Forces called for an increase in the number of Army divisions, a proportionate increase of tactical air wings was required. On December 1, 1950, TAC again became a major command with Lieut. Gen. John K. Cannon as Commanding General.

To carry out its mission the new Tactical Air Command is provided with headquarters and air forces to which all its units, including installations and facilities of the command, are assigned. The numbered air forces take care of administrative, training, and logistical support functions as necessary.

The Commanding General, Tactical Air Command, is responsible for organizing, equipping, training and preparing Air Force units and crews for combat operations. He must also plan and conduct combined operations with Army Field Forces and Navy Amphibious Forces.

At present, joint Army-Air Force operations are being continually planned. Starting in the spring of 1951 and continuing into 1952 extensive field exercises and maneuvers will be held for Army and Air Force units, including four National Guard divisions and four Air National Guard wings. These maneuvers are designed to have the ground and air units train jointly under simulated combat conditions. The first maneuver, called "Lone Star," which will be held in Texas in May, 1951, is designed to test procedures for air support of armored units, techniques of attack against armored units, and the movement of infantry regimental combat teams by air.

The guide for these exercises is a recent directive written by officers of TAC and of the office of the Chief of Staff. Preparation of the volume has included study of World War II history and experiences gained in the present Korean War, besides studies by boards established to consider air-ground operations.

The present Air Force conception of tactical air power is clear cut and well defined. The new directive presents this conception by first setting forth the three main tasks which must be accomplished by an effective tactical air unit.

They are in order of importance:

1. That air superiority in the theater of operations must first be gained and maintained by our planes.

2. That the selected battle area must be interdicted to deny the free movement of enemy troops, equipment and supplies.

3. That close air support must be provided to surface forces in the battle area.

To gain and maintain air superiority in the areas of operation is essential, for if the enemy has free play in the air our surface force must keep hidden or suffer severe losses and our planes giving close support are subject to constant attack. In order to gain air superiority tactical planes must be concentrated in mass against enemy planes in the air and on the ground. Enemy airfields and supply sources of fuel and lubricants must be destroyed. The job is of first importance and is a continuing one.

Interdiction of the selected battle area prevents the enemy from massing troops, equipment and supplies. It also prevents any significant enemy movement into, out of, or within the battle area and disrupts enemy communications to the point where general disorder may result.

Friendly surface forces in close contact with the enemy require close support by tactical air power to cover enemy targets which are out of reach of ground weapons. This support calls for extremely close coordination because it requires integration with the fire and movement of the ground forces.

The fact that no degree of relative importance can be attached to interdiction and close air support must be borne in mind. Each may assume a major role in a given situation and both are continuing in nature and may be simultaneous.

Visual and photo reconnaissance of the front and rear is a very vital requirement for the success of these three main jobs.

Aerial transportation of troops, cargo, patients, medical and other supplies is carried on by the Tactical Air Command as the situation demands. But in any large operation, this mission would be the responsibility of a troop carrier command.

Among the most important principles to be considered in the employment of tactical air power are the principles of organization. They include centralized control, mobility, flexibility, and integration of effort.

Centralized control provides the maximum exploitation of the mobile and flexible character of tactical air support. This can be achieved only when an organization and command structure exists which permits the immediate use of a mass air attack on a selected portion of the many targets at hand. This allows the commander at any major air echelon, within the limits established by the next higher commander of the joint forces involved, to shift the air power to meet the changing situation.

Although the tactical airplane is completely mobile within its operational radius of action, this radius does not permit it to be based at long distances from objectives. Time over target or depth of penetration must be prolonged to the maximum. This requires the organization and facilities (*Continued on page* 178)

Obsolescent B-26 Invader is only World War II bomber now being used in Korean conflict.

FAR EAST AIR FORCES

A Day in Combat...

Off to war, an F-80 equipped with newly-modified Fletcher wingtip tanks leaves Dogpatch, Korea, airstrip for the front.

Korean laborers, supervised by U.S. engineers, lay pierced steel matting on South Korean strip. Within hours, warplanes will use it for front line missions against the invading North Koreans.

When Communist troops poured across the frozen Korean mountains from Manchuria in November, planes of the Far East Air Force covered the withdrawal of UN forces. Since then, they have maintained a continuing counter-offensive.

Planes flown by FEAF, Marine, Navy, Australian, South African, Greek, and South Korean pilots have rained tons of napalm, rockets, demolition bombs, incendiaries and machine-gun ammunition on the Reds.

How does the FEAF operate? Follow the Air Force's planes through a single day in the Korean campaign. Let's say the day was Friday . . .

PREPARATIONS began Tuesday. Planners in FEAF headquarters spent hours over charts, photos and maps of North Korea. A rail center had been hit on a previous bombing attack by 19th Bomb Wing *Superfortresses.* Flying from Okinawa, they had smashed half the marshalling yards and rail lines in the Sukchon sector. RB-29's had followed, taking bomb damage evaluation photographs. These big photo planes from the 91st Strategic Reconnaissance Squadron took shots that showed

Superforts of Far East Air Forces fly high over broken cumulus clouds as they rain demolition bombs on marshalling yards near Kaesong in North Korea. Later in day when cloud coverage obscured ground, other B-29's dropped explosives by radar.

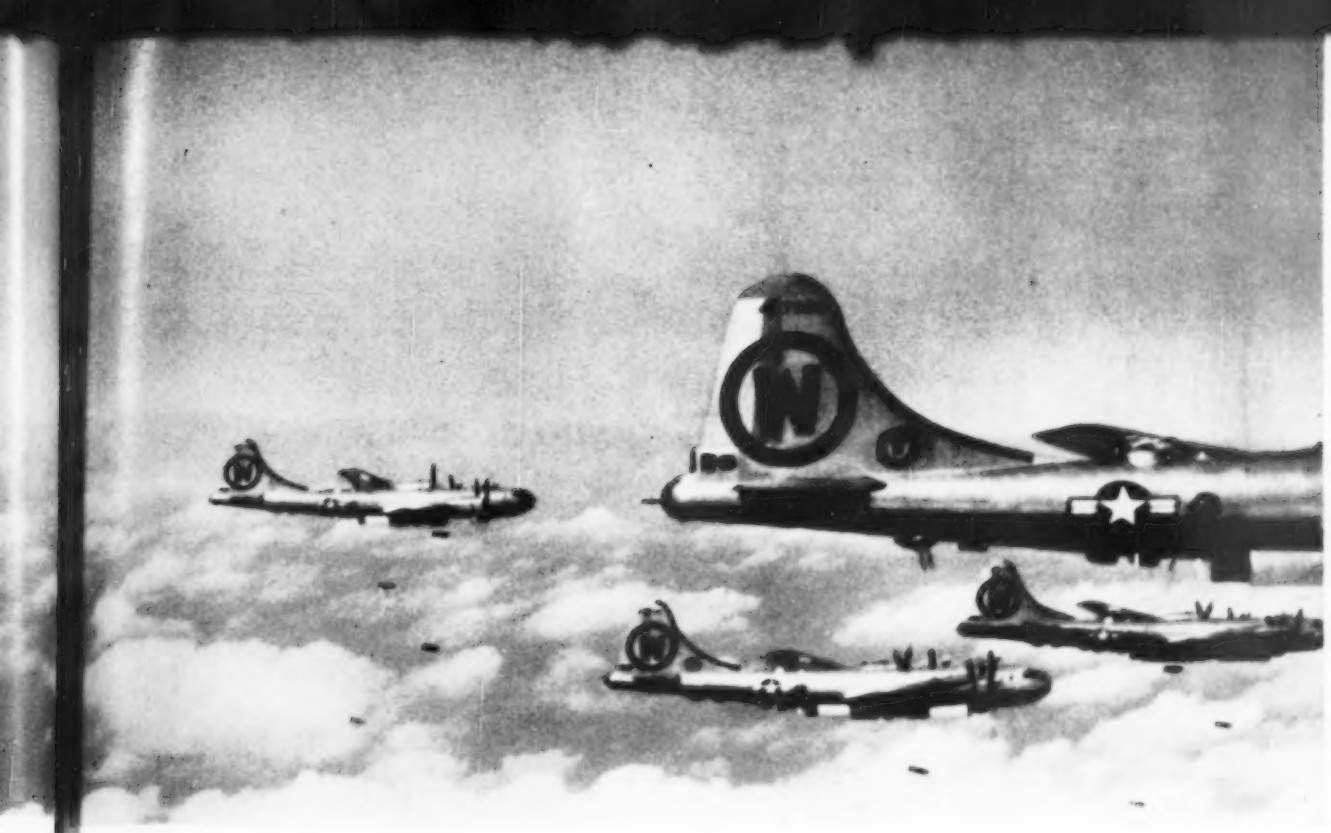
what the raid had accomplished. Then, Tuesday night and Wednesday, FEAF staff experts worked to pick Friday's targets.

By Wednesday evening, Friday's targets had been sent to FEAF Bomber Command. Tempo increased at *Superfort* bases in Japan and Okinawa. Armorers were readying 500-pound general purpose bombs; incendiaries became clusters of potential fire; machine guns were oiled and tested. Twentieth Air Force *Superfortresses* were whipped back into shape after Wednesday's all-out mission.

All day Wednesday and Thursday, unarmed planes of the 543d Tactical Reconnaissance Support Group flew over Communist positions, supply lines, and storage areas, photographing future tactical targets. An RF-80, finding a camouflaged ammunition dump disguised as a field of haystacks, was jumped by two Mig-15 jets which had sneaked over the Yalu River from their Manchurian sanctuary. The Mig pilots evidently didn't notice the bristling F-80 escorting the unarmed reconnaissance jet. While the RF-80 "racked around" in evasive action, its escort ripped into the Communists. FEAF's photoplane escaped. The Migs turned tail to Manchuria.

Tactical photographs were developed by "tac recon" specialists. New targets were evaluated and assigned to the 452d Light Bomb Wing and Third Bomb Group. On Friday B-26's would pulverize Red tactical positions, as well as targets of opportunity.

Thursday afternoon shaded into Thursday evening. At 6:30 p.m., a WB-29 taxied to the end of a runway in Japan, tested its engines briefly, and roared into the low-hanging scud forming to the north and east. This was not a bombing *Superfort;* inside the plane were weather instruments which crew members use to take pressure, temperature and barometric readings while checking weather conditions. The plane was, in effect, a flying weather station. The crew of this 1808th Air Weather Wing "recon" WB-29 headed for North Korea. For nine



hours or more, weather data would be compiled for Friday's briefings.

A few minutes after the *Superfort* took off, another WB-29 left an air base on Okinawa. A typhoon was twisting its way northward from Luzon. The effect of the typhoon on Friday's air operations could be serious.

This second weather plane poked its nose into the storm, underwent terrific buffeting from the turbulence, got to the center, made necessary observations, and returned to its base with a weather report.

About 10:00 p.m. Thursday a flight of B-26 night intruders of the Third Bomb Group climbed out over the Sea of Japan to lash Communist troops and supplies. The B-26 briefing officers had pin-pointed North Korean troop concentrations and convoys—disclosed in photos taken by tactical-scouting RF-51's and RF-80's on Wednesday afternoon and Thursday morning. Armored vehicles and tanks were creeping down a winding, narrow road northwest of Pyongyang.

As the B-26's crossed the coastline of Korea, they passed a Fifth Air Force all-weather *Twin Mustang* interceptor. This F-82, from the 68th All-Weather Squadron, was on its way home after making a reconnaissance with radar.

Deep in enemy territory the B-26's found the blink of headlights which betrayed a convoy of Reds. They dove on the lights, 16 .50-caliber guns per plane clattering over the roar of the engines. Fires from the strafed trucks flamed into the night. Another B-26 intruder found armored vehicles. Its 500-pound (*Continued on page* 134)

Most FEAF planes, like this Douglas Invader, soon got wartime names. The B-26's fly deep support missions behind enemy lines.

Cargo command Fairchild C-119's parachute 40 tons of supplies to ROK First Division troops fighting near Unsan in North Korea.

ALASKAN AIR COMMAND

Air Force at the Back Door

Cold is the first enemy as we organize our northern frontier.

LAST SUMMER a pilot of the 64th Fighter-Interceptor Squadron of the Alaskan Air Command was making a routine flight from Elmendorf Air Force Base to Ladd AFB, not far south of the Arctic Circle. Nearing his destination he suddenly entered an area of super-cooled air. There was only a light cloud formation and no indication of icing conditions. But heavy glaze ice completely covered the forward half of the canopy and iced-up the pitot tube. The pilot had met one of the peculiar icing conditions of the Arctic—conditions unlike those of any other part of the world.

Though his visibility was cut off completely, the pilot knew he was flying at a safe altitude. Taking advantage of the jet's ability to climb, he quickly increased power and went up to 26,000 feet, where in a matter of minutes the ice evaporated, permitting him to proceed to his alternate field.

In fortress Alaska, which the Air Force is building at the northern "back door" of the United States, weather combined with the mountainous terrain is the chief enemy.

It is not unusual for a pilot to take off from Elmendorf into a cloudless sky, yet land where a heavy fog blankets his destination and Aleutian winds whip across an icy landing field. In Alaska more than anywhere else a pilot's life depends upon his navigational skill and success in making Ground Control Approach (GCA) landings.

In the extreme cold—down to 60° below in the interior—maintenance and manpower problems also become more difficult than in temperate climates. And since winter turns Alaska's countless lakes into frozen landing fields for a potential enemy, interceptor planes must be ready to take off on brief notice in any weather.

Rigorous cold-weather tests are required for all equipment flying in Arctic. Planes become "cold-soaked" and take hours to warm up. Here six heaters, one for each engine, are used to warm reciprocating engines of a B-36. Accessories of planes are also affected by cold.

F-80's fly over typical Alaskan mountain terrain. Fog and mountains combine to create the biggest hazard of northern flying.

The overall problem of manpower for the Alaskan Air Command is a complex one. Men cannot endure extreme exposure for more than a few hours at a time, and each individual job takes more manhours to perform, whether it is changing a mag on an airplane or standing guard duty as an "air policeman." To man a fighter wing in the Arctic takes a third more personnel than is required in the United States. More men are needed to maintain communications, clear runways, and keep vehicles and aircraft operating. Routine support work which is accomplished smoothly in temperate zones is a bigger job in the north.

Maintenance is also a persistent problem of the AAC because of the limited hangar space and the limited availability of parts. Cold weather affects an airplane much as it does an automobile.

When planes cannot be stored inside overnight they become "cold-soaked" from exposure, and the pre-

Cover on jet wing prevents snow and ice from collecting. Even tiny accumulation spoils airflow on laminar wings.

Rotary snowplows stand ready to clear Alaskan runways. Snowfall, however, is really heavy only in a few coastal locations.

Herman-Nelson heater is used to pre-heat C-54 before take-off. In cold, batteries must be kept warm, tires develop flat spots.

Radar antennas scan the skies over Alaska, part of a 24-hour defense watch that helps to guard vital U.S. areas as well.

flight process turns into a difficult, time-consuming operation. Batteries, which have been in warm storage, must be installed. Landing gear shock struts must be inflated. Careful inspections must also be made for fuel and hydraulic leaks, since rubber seals and connections are hardened excessively by cold. Tires are also affected in this way and the flat spots that form must be slowly rolled out.

In all cases where temperature is low the plane must be pre-heated. This may involve towing it into a hangar or a "nose-dock," or may be done with Herman-Nelson heaters attached to the plane. It often takes hours to warm the electrical connections, engines, and instruments sufficiently for flight. And the men working outside in enough clothing to keep warm find the task a long and fatiguing one.

Another problem the AAC faces is that of supply. The total population of Alaska barely equals that of Kansas City, Kan., yet its area is enormous. The territory, if superimposed upon the United States, would touch the Atlantic and Pacific oceans, and both Canada and Mexico. Communities are widely scattered and provide only meager sources of supply, labor or transportation. The USAF has no alternative but to build a fortress in the Arctic with supply lines reaching more than 1,000 miles back to the United States.

Air Force bases have to be supplied with every necessity of life, from eggs and butter to warm clothing and shelter, as well as with men and airplanes. The transportation of all equipment and supplies presents a problem that cannot be solved by air operations alone. Thus the Army and Navy, which have been long established in Alaska, are close working partners of the Air Force.

The Navy guards the sea lanes and coastline from Kodiak Island, which has a harbor open all year round. While the Army handles the port loading and unloading, and the land transportation of military cargo for the Air Force, the Navy brings it up the long sea route from the United States.

Although the Army is primarily concerned with ground defenses, it is helping aviation engineers build housing, airports and runways so that supplies can flow by every means into the tightening defenses of Alaska.

Gen. Billy Mitchell, the prophet of airpower, once pointed his ruler at a map of this strategic area and said, "He who controls the skies over Alaska controls the world." Alaska is astride the northern great-circle air routes to the United States. And since all potential enemies are in the northern hemisphere the territory would be of extreme value to any enemy launching an attack on the U. S.

The Japanese recognized this early in World War II. When Japanese forces invaded the Aleutians, in June, 1942, Alaska was their goal. They never got beyond the islands of Kiska and Attu—but it took two years to push them out.

Today the Russians realize the importance of controlling Alaska. Early in January of this year an article appeared in the influential Soviet magazine *Literary Gazette*, claiming that Alaska in the hands of the U. S. is a "springboard for aggression." To American military planners it is the first outpost of defense against aggression.

But no defense such as Alaska has known in the past will protect it from future attack. The vastness and formidable topography of the territory make one thing apparent: if Alaska is to be attacked and captured, an enemy *must* come from the air. Likewise, the territory's primary defense must be an air defense. Alaska must be an air theater, and the Alaskan command an air command.

Before World War II there (*Continued on page* 144)

Planes and Men of the Air Force

From Korea and Japan, across Canada and the North Atlantic to Europe, air power forms both a shield and a mailed fist guarding the United States.

Shooting Star

Versatile Lockheed F-80 is still in service al- though it was designed during World War II.

Jets in Germany

Republic F-84E's (right) flew from Texas to Furstenfeldbruck, Germany, in 13 hours flying time last fall. Armorers of 86th Fighter-Bomber Wing (above) service machine guns.

SAF

Alaskan Fighter Patrol

F-80C's of the Alaskan Air Command (above) fly over ice-strewn Cook Inlet. While jets guard northern outposts, they provide cold-weather training (left) for men and planes.

Transonic Bomber

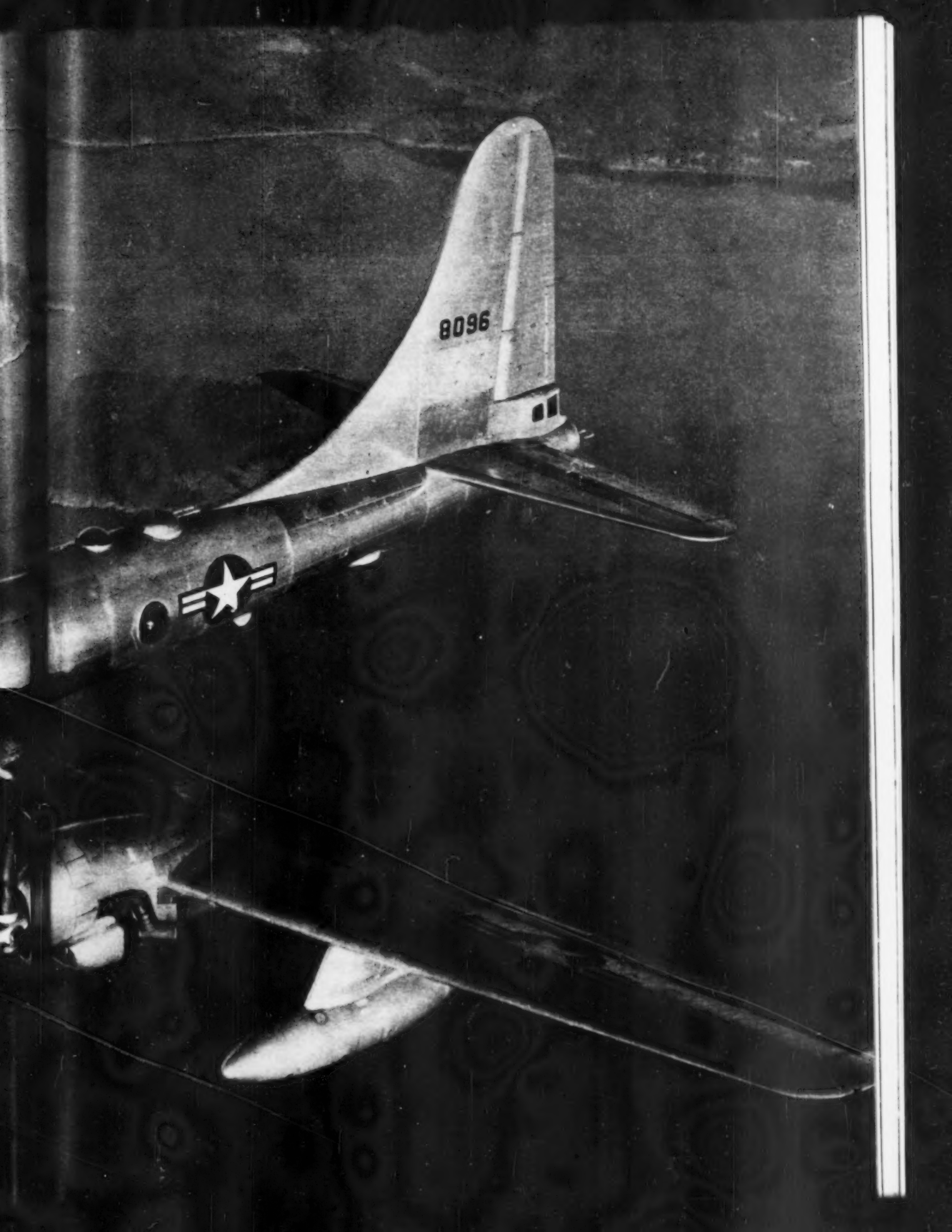
Boeing B-47 is rated a medium bomber, but it weighs more than 185,000 pounds, hauls over 20,000 pounds of bombs at 600 m.p.h.

Mig-Killer

Sweptwing F-86 (Sabre) takes off from Korean runway for flight against Russian-built jets. Fighter has excellent record against Mig-15's.

B-29's Progeny

The B-50 Superfort is an intercontinental bomber that can carry five tons of bombs 6,000 miles.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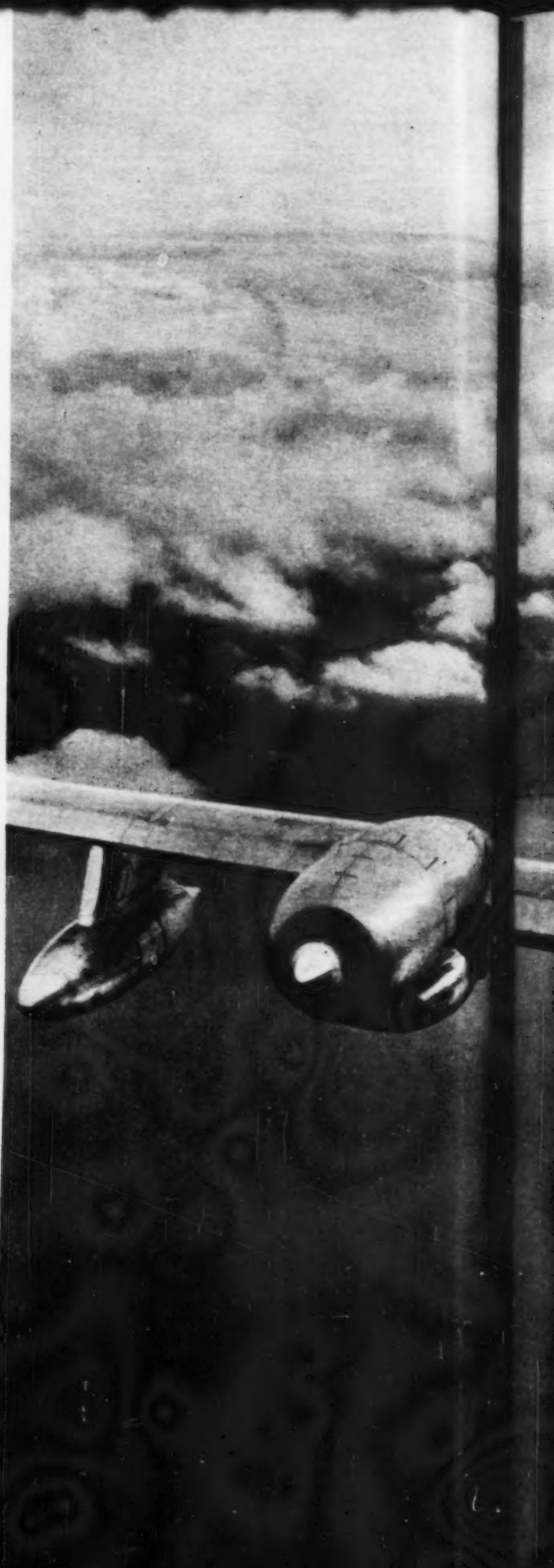
Plane Tracker

Radar information is called to men behind master Plexiglas panel. They plot data on panel for plane controllers who sit beneath board

ter Plexiglas panel. They plot data on panel
for plane controllers who sit beneath board

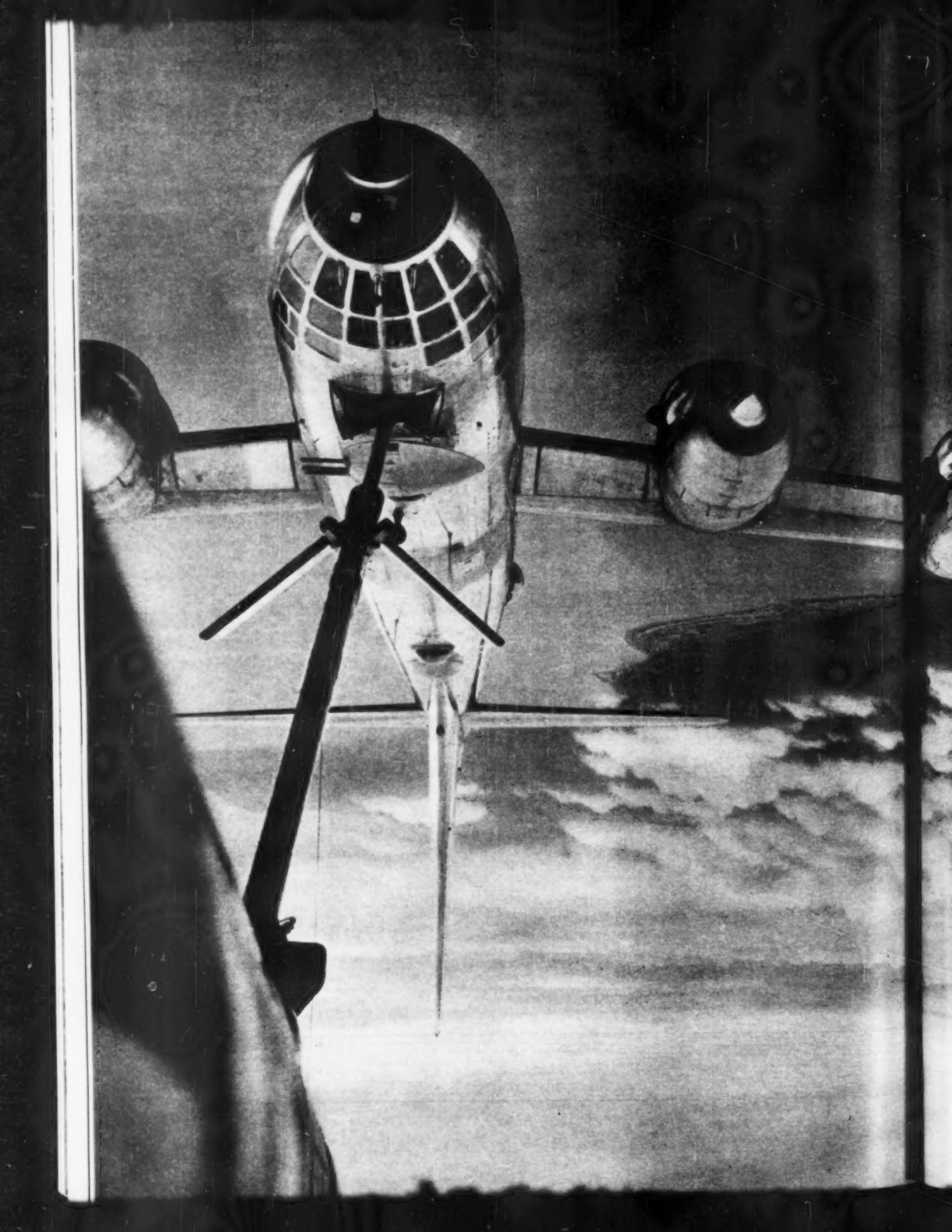
Plane Hunter

Northrop F-89 (Scorpion) is all-weather and night fighter carrying its own radar equipment.



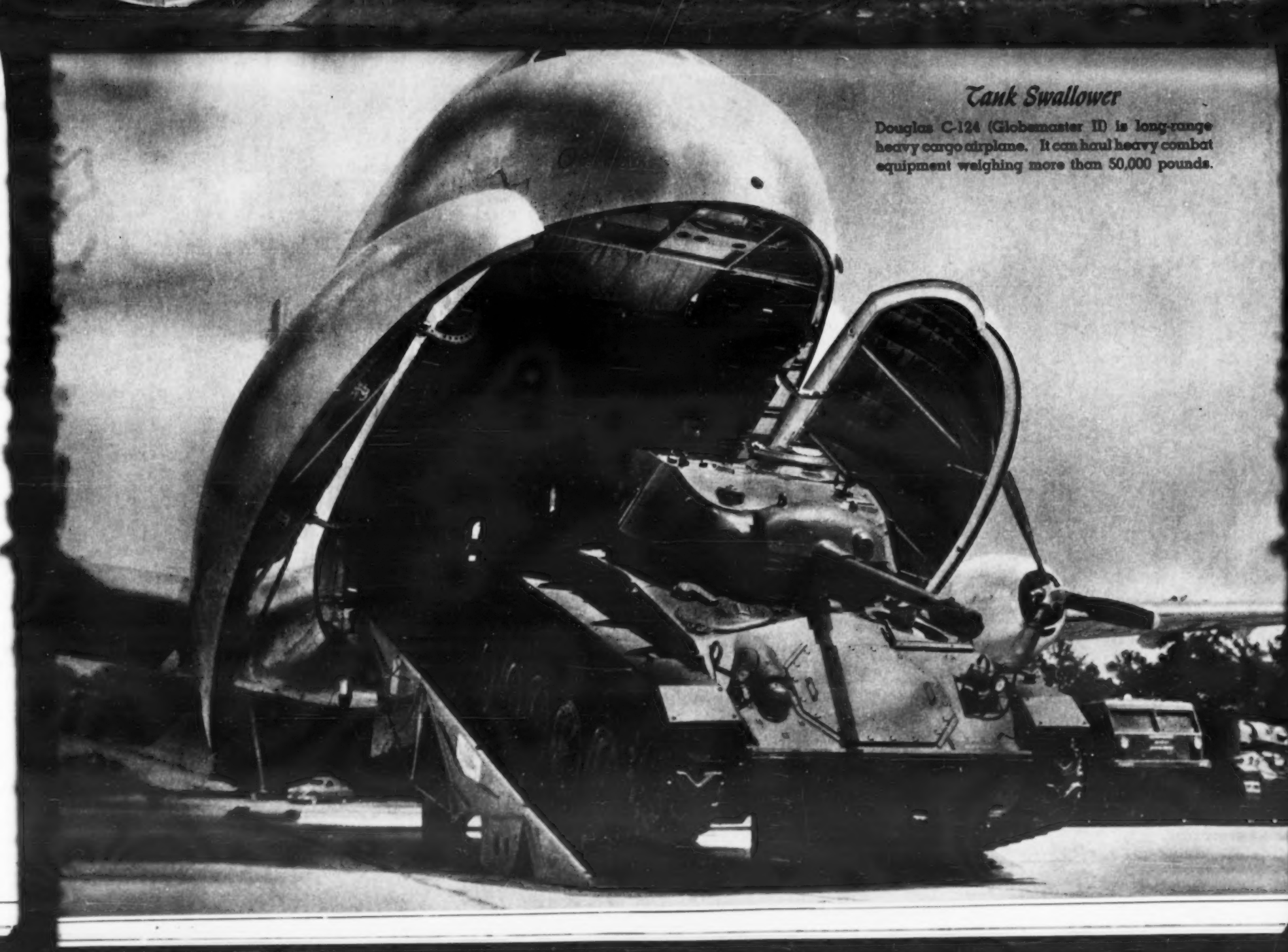
Thirsty Bomber

Maximum ranges have been increased enormously with advent of successful aerial refueling. Telescopic boom, above, has V-shaped controls that permit it to be "flown" to bomber.



Aerial Truck

Fairchild C-82 (Packet) was designed solely for troop and cargo hauling. It can lug any infantry fighting equipment except heavy tanks.



Tank Swallower

Douglas C-124 (Globemaster II) is long-range heavy cargo airplane. It can haul heavy combat equipment weighing more than 50,000 pounds.

THE MEN AND THEIR JOBS

IMAGINE FOR A MINUTE that you're Robert B. Doakes, 21, of Cape Girardeau, Mo.,—and you're all set to join the Air Force. You leave Cape Girardeau on the 3:15 train, enlist in St. Louis, and figure you're well on your way toward a career in the wild blue yonder.

If someone asks you what kind of job you'll get in the Air Force, you'll probably shrug and say—"Why, aerial gunner, I guess."

Or if you've had a couple of years of college and fill the physical bill, you might figure you'll be a pilot.

But there's more to it than that.

There's even more to it than the long training period, and the rough flight schooling, and the stiff standards.

If you're Robert B. Doakes, *statistic*, instead of Robert B. Doakes, *individual*, you've got a surprise in store. Statistically speaking, you have just four chances out of 100 of ever being a flight crew member. Ninety-six of every 100 enlisted men in the Air Force have non-flying jobs.

And if you're an officer, there are four chances out of 10 that you'll have a ground job.

Regardless, airman or officer, nine out of every 10 men in the Air Force have ground jobs.

What do they do? Well, there are 350 distinct jobs for airmen, and 250 for officers.

Important as these career fields are for Robert Doakes and all the John Does of the Air Force, the Deputy Chief of Staff, Personnel, has many other responsibilities. For instance, he is primarily concerned with proper utilization of manpower—finding the right man for the right job. He administers the aviation cadet test program, the classification and assignment of men and the Airman Career Program.

As Pvt. Robert Doakes, you might get assigned to a heavy bombardment squadron and hold down any of the 158 airmen's jobs required in a B-36 unit. You might possibly be an airborne radar observer or an aircraft radio operator, but the chances are just as great that you'll be better fitted as a plumber or an office machine repairman. And a heavy bombardment squadron needs plumbers just as it needs radio operators.

Or if you're Lieut. Robert Doakes you might very well be assigned as a pilot, co-pilot or bombardier. But there's also a likelihood that you'll be a signal supply officer, an air (*Continued on page* 132)

There are 350 different jobs for airmen and 250 for officers in the Air Force. Not all can be aircrewmen or pilots like the men below. At left, 2nd Lieut. William H. Rowland, an F-84 pilot in Germany, is one of the six out of 10 officers who are on flying status.

C-54 is loaded at Thule, Greenland, to fly supplies and equipment to isolated stations which could not be reached by surface craft.

Isolated lineman fixes cable linking three Arctic airbases.

NORTHEAST AIR COMMAND

Life in the Sub-Arctic

Even the easiest jobs become difficult in this cold northern defense command.

PILOTS ASSIGNED to the U. S. Northeast Command (NEAC) may report to a base in Greenland where the sun shines 24 hours a day. But the eerie perpetual daylight is only one of many strange things they encounter in the following months.

They find that in sub-zero weather jobs they used to complete in an hour now require four hours of intense effort. A mile-and-a-quarter walk in this near-Arctic climate is equivalent to a 10-mile hike in the States.

These NEAC pilots and ground station personnel may be stationed anywhere in the U. S. Northeast Command's "area of responsibility"—a vast region including Quebec, Northwest Territories, Labrador, Newfoundland and Greenland. They maintain bases needed to fly U. S. military planes over the North Atlantic and they support U. S.-Canadian weather observation stations. Perhaps more important, they have the job of supporting Canadian and U. S. military action in defense of North America.

Before they fly any missions, NEAC pilots attend the Arctic Indoctrination School at Goose Bay, Labrador, where they are taught how to stay alive in case of forced landings, and where they learn about the dangers of Arctic flying and living.

Popular myths are promptly exploded at the Arctic School. Here the pilot learns he must never rub a frozen area of his body with snow—the friction might break the skin and the snow draws out the body's heat. He learns that vigorous exercise is dangerous if the body becomes numb from the cold. Rapid movement may result in

frosted lungs. These, and other survival tidbits, may save his life if he is forced down on one of the long flights to northern weather stations.

As a regular course in this unusual school, the pilot—along with 25 or more other students—is flown into the Labrador back country and purposely "lost" in the wilderness. For 48 hours he has the task of living as comfortably as possible in sub-zero weather. His survival equipment, with which every NEAC plane is supplied, consists of water-resistant matches, fishing gear, axes for breaking ice, C-ration kits, first-aid supplies and ready-made smoke signals.

Supervised by an experienced officer and airman, the pilot learns to construct lean-to's with floors made from spruce boughs. Rabbit snares are set up to provide food. He is shown how to use every available resource for survival.

Along with the other "survivors," he builds snow signals hoping that observers in a helicopter will circle the area and spot the downed plane.

When a plane is reported missing, reports immediately go out through the command. Rescue units of the Air Rescue Service are dispatched promptly. Airways and Air Communications Service keep the radios and teletypes busy with communications between the rescue commander and the searchers. The weather detachments throughout the command area furnish the searching parties with up-to-the-minute reports on the weather.

Numerous subordinate weather bases, often extremely small, are located over the entire command—many of them in isolated, frigid spots. In addition to gathering vital weather data they supervise repair of communications lines and furnish rescue facilities when a downed plane is reported.

Key Northeast Air Command bases are the three leased airfields in Newfoundland at St. John's, Argentia, and Stephenville; an installation at Goose Bay, Labrador, and a base on the southwest coast of Greenland.

Each year, U. S. and Canadian pilots from these bases fly the "re-supply airlift," hauling equipment and provisions to the remote weather stations. They move huge stockpiles during the spring months, often having to construct their own runways on frozen inlets, bays and lakes.

The "re-supply" boys work in the Arctic cold until their spring job is finished. But the NEAC maintenance men who service the USAF's Long Lines Repeater Cable System in Newfoundland have a year-round outdoor job. This cable system with its many telephone and telegraph wires stretches all the way across Newfoundland, linking three of the key bases. Built by the Canadians for the U. S. Army during World War II at a cost of $14,000,000, this cable has been serviced by U. S. maintenance crews since its completion. (*Continued on page* 164)

Repair crew hauls equipment to fix break in NEAC's Repeater Cable System, only cable U.S. owned and operated on foreign soil.

After Labrador crash, litter patient is loaded in Air Rescue Service ski-plane. Despite exposure and injury, patient lived.

Staying alive in Arctic is simple if you know how. Here, a student at survival school builds a fireplace in spruce shelter.

Primitive transportation is sometimes used for rescue missions. Airmen prepare to leave plane by dogteam to aid snowbound flyers.

USAF air police and roadside sign symbolize presence of the Air Force in Germany. Air police patrol the highways of the Wiesbaden Military Post, controlling traffic and aiding stranded motorists. Cpl. Frank MacVaigh stands beside patrol car.

Complete repair facilities exist in Europe. Mechanics of 36th Fighter-Bomber Wing of 2nd Air Division have split fuselage of F-84E and are replacing the engine. F-84E is becoming standard jet fighter-bomber of North Atlantic Treaty countries.

USAF IN EUROPE

Watch on the Rhine

REPORTING to a joint session of Congress on his return from a lightning tour of North Atlantic Treaty Organization (NATO) capitals, General Eisenhower declared: "Our job is to build a wall of security around the free nations of the world."

"The mission of USAFE is to support that policy," said Lieut.-Gen. Lauris Norstad when he assumed the post of Commander-in-Chief, USAFE, on January 22, 1951. Because of the vast territory spanned by USAFE (virtually all the "free" nations of Europe), this implementation of General Eisenhower's declaration can be no easy task. The multitudinous problems involved are being ironed out now.

Concurrent with the appointment of General Norstad as the overall air commander to Europe came the logical and anticipated elevation of USAFE. On January 22 USAFE became the sole major USAF Command on the eastern side of the Atlantic. It was charged with the double task of (1) uniting the 12 air arms of the NATO signatories and (2) being the policy-making as well as the operational organization in Europe. Some of the NATO air forces such as Holland, Denmark, and France will be in possession, shortly, of F-84E's *(Thunderjets)* under the Mutual Defense Aid Plan paralleling the present fighter-bomber equipment of USAFE in Germany and the United Kingdom.

The recent upgrading of USAFE makes it the largest self-contained American air fighting force outside the United States excluding the Far East Air Forces now fighting in Korea.

F-84E Thunderjets of 36th Fighter-Bomber Wing loaf through skies over Germany at 500 m.p.h. This plane is or will be used by The Netherlands, Denmark and France.

USAFE is key to our growing military power on Continent.

As a result, USAFE can supply strategic and tactical bombing forces, plus transport and fighter defense units, all geared for immediate action in the event of any emergency. The NATO air forces of "free" Europe are already working in harmony with USAFE. This is the tangible answer of the Western World to the threat of invasion from the East.

The Geography of USAFE

Geographically speaking, USAFE has two main springboards for immediate operations. The larger and more important of the two is based in the U. S. Zone of Germany and takes in the overall planning and tactical side of USAFE. This is the Twelfth Air Force comprising the Second Air Division (tactical support with jet fighter-bombers), the 85th Air Depot Wing (Supply and Maintenance Depot) and the 61st Troop Carrier Wing.

On the strategic side there is the Third Air Division based in England, responsible to USAFE for long-range bombers and escort fighters. The Third Air Division consists of the 59th Air Depot Wing, a number of housekeeping echelons and, of course, the visiting three or more medium bombardment groups which are rotated regularly.

Smaller springboards are under consideration in the Mediterranean area and elsewhere.

Missions of USAFE

Apart from the prime mission of trying to keep the peace over Europe, USAFE is responsible for the safety of U. S. personnel and property in Europe. In addition to being in a constant state of readiness for any emergency, USAFE maintains air navigational aids within the American Zone of Germany and for the air corridors into Berlin and Vienna. Add to this the operation of air terminals of Berlin (Tempelhof) and Vienna (Tulln), the facilities of which are open to civilian as well as military aircraft (as are the other flight facilities).

Flight services include the maintenance of a flight

American and RAF flags fly side by side in England. Unprecedented cooperation exists between USAFE and European allies.

"following and reporting" organization and provisions for securing authority for non-scheduled flights from their points of origin within Europe, North Africa and the United Kingdom to their destination. USAFE also maintains operational control of the Airways Communications System and the Air Weather Service. In 1950 there was added an Air Rescue Squadron which sweeps an area even greater than the operational territory of USAFE.

Part of the responsibility of USAFE is to cooperate with other Allied Air Forces in joint air exercises and combined land, sea, air exercises, interchange of ideas and personnel, all designed to aid the smooth running of an overall European UK-Mediterranean command under Eisenhower's SHAPE (Supreme Headquarters, Allied Powers in Europe). In recent months USAFE has cooperated with the air forces of Britain, France, Belgium, Holland, Denmark and Norway.

As an example of the goodwill existing among the participating North Atlantic Treaty air forces, USAF units have been invited to take part in Norwegian maneuvers and the Norwegians have participated as observers in USAFE war games.

The *entente cordiale* was further advanced during the 1950 French combined maneuvers when units of the Second Air Division added their weight to the games. Troop carrier formations of USAFE were used to transport French paratroopers on practice jumps. The story of European cordiality continues in this vein.

Combat Wings (strategic fighters and bombers) serve with USAFE for periods ranging from 90 days to six months, the former applying to the strategic bombers based in England. Finally, as far as possible all major overhauls of airplanes and engines are conducted by USAFE at one of two giant repair and maintenance depots (at the 85th Air Depot Wing, Erding, Bavaria, and the 59th Air Depot Wing at Burtonwood, England).

Problems and Solutions

Running the Air Forces in Europe is not as simple as might appear from the efficient organization on paper. Just the fact of being in Europe brings up a whole raft of complications and diplomatic pitfalls. Conversely, being in Europe gives the USAF a fine chance to work with the allied powers of NATO.

For example, one of the difficulties is the problem of national boundaries. France, the United Kingdom, Italy, and Benelux (Belgium, Netherlands and Luxembourg) all permit overflight but, even so, large formations or tactical aircraft flights require diplomatic clearance beforehand. Other nations require diplomatic negotiations before any overflights. The net result is a severe limitation on the air training area available.

On the other hand, USAFE has been kept tuned to a high state of training ever since 1945 despite all the fluctuations in strength and changing conditions. One of the best ways this has been accomplished has been through joint air exercises with other nations, as well as with Army and Navy units in the European Command.

Accommodation is a problem in any country. In the U. S. Zone of Germany, German (*Continued on page* 169)

Facsimile machines in control centers receive weather maps from Rhein-Main base.

Fairchild C-82 Packets of 61st Troop Carrier Wing fly over striped fields of Western Germany. Rhine is in background. Wing has three fully-equipped squadrons of C-82A's.

CONTINENTAL AIR COMMAND

Even before the Korean war, most Air Force officers were reservists.

Civilians in Warplanes

WHEN THE KOREAN WAR started, practically all the Air Force's 354,000 enlisted personnel were "regulars," the popular term for professional soldiers.

On the other hand, only one-third of all officers were career men. The rest were reservists on extended active duty.

Then late last summer, as the Communist hordes tried to capture Pusan, thousands of additional AF reservists and Air National Guardsmen were ordered into active military service to help fill out the growing military establishment.

Four reserve wings—three troop carrier outfits, the other a light bomber unit flying B-26's—were ordered to duty between August and October. Of these, the 452nd Bombardment Wing and the 437th Troop Carrier Wing, from California and Illinois respectively, sped to the Far East combat area. Almost immediately upon their arrival in Japan they were flying death-dealing missions over Korea—and doing an exceptional job.

By mid-January of this year the two remaining reserve wings and the 10 Air National Guard groups with their supporting elements had been ordered to duty but were still in the Stateside force.

Meanwhile, some 60,000 individual reservists had come on duty. Many of these were volunteers; others were ordered in to provide experienced men in the

Main source of young officers for Air National Guard and reserve units is the Air Force ROTC, conducted at more than 100 colleges and universities. Here, a group of ROTC advanced course students at the University of Maryland inspect a Douglas Invader (B-26).

Reservists in squadron ready-room prepare for troop carrier mission. Most of organized reserve is now in active service.

In Hawaii, Air National Guard flies F-47's. The normal complement of ANG is 27 wing headquarters and combat groups.

rapid build-up of the regular establishment.

On January 18, a plan was announced for ordering a large portion of the remaining reserve and Air National Guard into active military service within a few months. The plan envisioned the call-up of all 21 training center reserve wings, 12 wings of the Air Guard, volunteer air reservists and members of corollary units.

The Air Force reserve organization, which is the major responsibility of the Continental Air Command (ConAC), is simple.

Fundamentally it consists of the Reserve and the Air National Guard. These two groups are supplemented by the AF ROTC (a feeder organization which provides both the Guard and Reserve, and to some extent the regular Air Force, with new second lieutenants).

The Reserve is divided into two groups.

● The Volunteer Air Reserve, the largest of the groups, is the main pool for members of the USAF reserve not on active service. In early 1951, 300,000 reservists were on VAR rolls. They do not get pay for training but they do have the opportunity to accumulate credits for promotion and retirement through participating in the extension course of the Air University and in VAR unit programs. Volunteer Reservists can also acquire credits by aiding as instructors in Civil Air Patrol and Explorer programs.

● The Organized Air Reserve on January 15 consisted of about 9,000 mobilization assignees, 18 troop carrier and three light bombardment wings of reservists at training centers throughout the U. S., and about 200 corollary units at 50 or more Air Force bases. Mobilization assignees are officers and airmen who are earmarked and trained for specific jobs on M-Day. Corollary units are reserve outfits established at Air Force installations, using regular USAF facilities and equipment under guidance of training supervisors.

● Of the Air National Guard's normal complement of 27 wing headquarters and combat groups stationed throughout the 48 states, the District of Columbia, Puerto Rico and Hawaii, all of the Air Guard units have been ordered into or alerted for active duty in the U. S. Air Force.

Air Guardsmen on inactive status train monthly and on annual 15-day encampments much as the Organized Air Reservists do. It is contemplated that, as the aircraft production rate and the needs of the Air Force increase, all ANG units eventually will become jet fighter outfits. On June 30, 1946, the 120th Fighter Squadron of the Colorado ANG became the first unit of the post war Air Guard to be organized. By May 26, 1949, in less than three years, all of the proposed units of the Air National Guard had been organized and Federally recognized.

Both the Reserve and the ANG have interest in the AF ROTC Program of the Continental Air Command conducted at more than 100 colleges and universities, for this is their main source of young commissioned officers. Some Reserve Forces commissions are obtained through Officer Candidate School, the Aviation Cadet Program, or by direct appointments granted on the basis of education and professional or other specialized training and experience, but the majority are earned in the ROTC Program. Some ROTC graduates take flying training in hopes of becoming pilots or getting other aircrew ratings.

The Civil Air Patrol, founded on December 1, 1941, operated during World War II, first under the Office of Civil Defense, then under the War Department. This volunteer civilian organization flew thousands of miles on submarine patrols and on tow-target and liaison missions for the Army and Air Corps in wartime.

In May, 1948, the CAP was established as a permanent civilian auxiliary of the Air Force, to provide an organization of private citizens adequate to assist in meeting local and national emergencies. Its active rolls include 27,500 cadets from 15 to 17 years of age and 42,300 senior members. Nearly 200 AF officers and airmen are on duty with the CAP in administrative, advisory, and instructor capacities.

(*Continued on page* 162)

Senior Boy Scouts, called Explorers, talk with jet pilots at Stewart AFB. The reserve program includes Explorer activities.

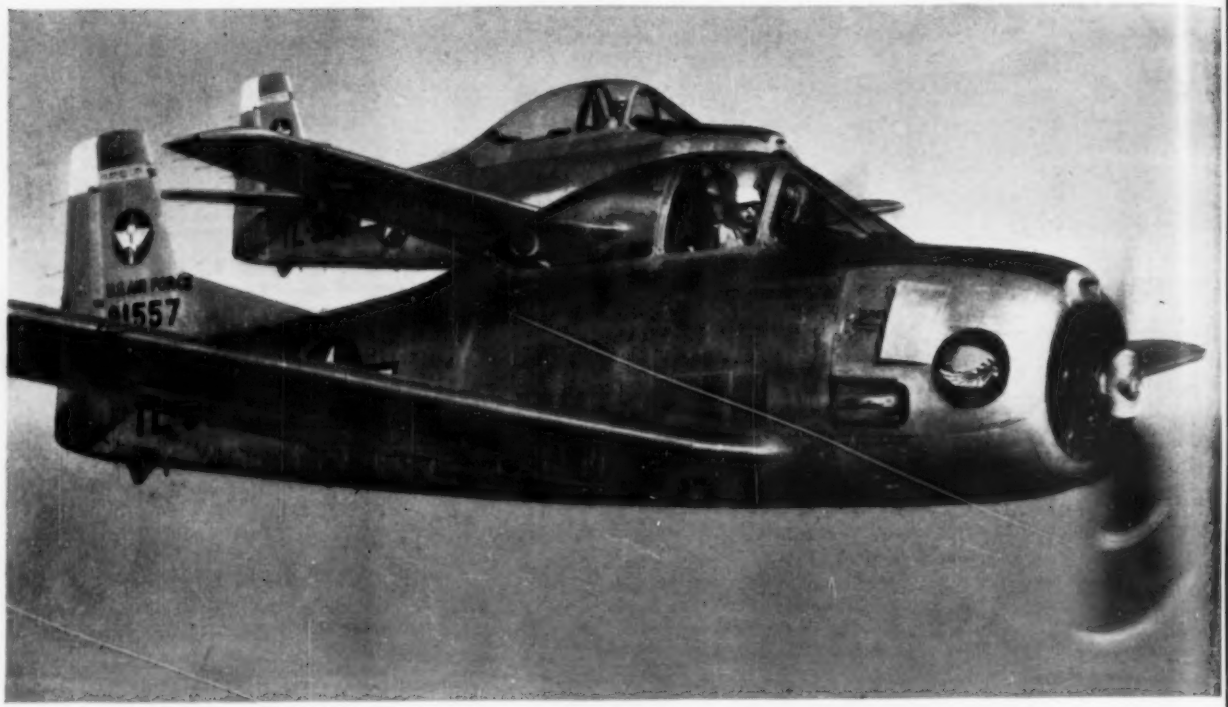
Air Force Auxiliary is the Civil Air Patrol. Its 69,800 members fly search-rescue missions (above), run 7,000-station radio net.

Corollary outfit members, like these Kelly AFB reservists, train at regular airbases with planes and equipment of active-duty squadrons.

Weekend training, often under simulated combat conditions, keeps reserve in trim. Above, 434th Troop Carrier Wing (Reserve) of Indiana drops paratroopers from twin-engined Curtiss C-46's. In January, 18 troop carrier wings were included in the organized reserve.

AIR TRAINING COMMAND

From Civilian To Pilot in 60 Weeks



New trainer is North American T-28, now in service at the advanced school at Vance Air Force Base, Enid, Okla. Multi-engined students fly 70 hours in the T-28, 65 in the B-25 bomber. Some of the cadets are picked to fly the Lockheed F-80 (Shooting Star).

If you join the Air Force, you'll attend one of the world's largest military universities.

Student navigator 'shoots sun' with sextant from aircraft astral dome. Much training at Ellington Air Force Base consists of solving flight problems during a 40-week course.

IF YOU VOLUNTEER for the Air Force, the Air Training Command can move you in 60 weeks through two flying schools and into the cockpit of a combat plane as a second lieutenant.

In the same length of time you can learn to drop tons of the most destructive bombs ever invented from 40,000 feet onto a space the size of a baseball diamond.

After only 40 weeks' schooling, you can use radar and charts to guide a bomber-load of fire and brimstone thousands of miles through all kinds of weather.

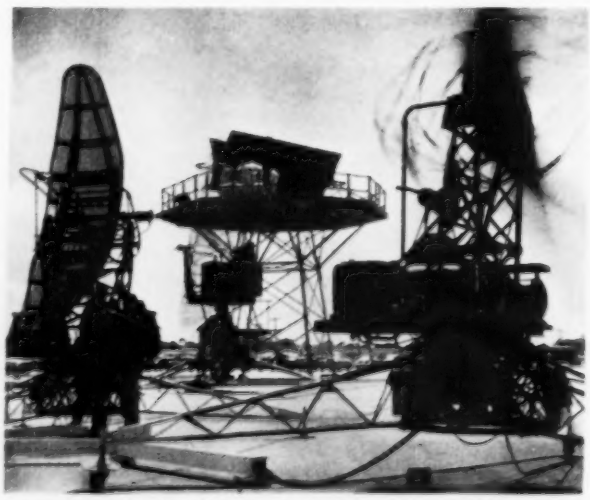
Even if you've never squeezed a trigger more deadly than a Hopalong Cassidy six-shooter, you can be taught in a few weeks how to bring down an enemy plane with an aerial machine gun.

Today the Air Training Command is preparing for any eventuality, but it is still small potatoes compared with the peak year of 1944. During World War II, production of pilots jumped from 700 a year in 1939 to more than 80,000 in 1944. In addition, thousands of navigators, bombardiers and gunners were trained as aircrews. Nearly 500,000 (*Continued on page* 80)

Sitting in 'second story' of B-36 at Sheppard Air Force Base, four mechanics get orientation on instrument panel of big global bomber.

Propeller specialists train at Chanute Field, Ill. The base gives 31 courses for airmen, ranging from sheet metal worker and aircraft welder to control tower operator and weather observer.

On a forest of poles, powermen and fixed wire trainees attend open-air class at Francis E. Warren Air Force Base. Poles last about one month before being gouged and ripped beyond usability.



Trainees learn how to maintain, install and operate radar warning systems at Keesler Air Force Base. The Air Training Command has 144 different technical training schools throughout the U.S.

mechanics, communications men and other specialists were trained as ground crew members. In that one year of 1944, nearly half of the more than 2,000,000 Air Force men were educated for military jobs.

President Truman's recent announcement that the Air Force will build up to 96 groups—or even larger—requires an Air Training Command expansion program similar to that of 10 years ago.

The Command exists today as an overall headquarters and 21 major training stations plus two civilian-operated contract pilot-training bases. The huge university is run by Maj. Gen. Robert W. Harper, a 49-year-old career soldier whose headquarters are at Scott Air Force Base near Belleville, Ill.

But the work of the Air Training Command is done in the thin air above California where young officers learn to set their sights on invisible targets thousands of feet below. It is done in the heat and wastes of the Nevada gunnery range, where pilots learn to use their aircraft as gunmounts and rocket launchers. At the "desks" in flying classrooms, navigators trace lines across charts and learn to guide bombers across continents and oceans to their objectives, and home again. In the flying schools, former college boys learn to solo; and in hundreds of classrooms scattered from New York to California, men learn the skills required to maintain the Air Force's striking power.

Let's say you have volunteered for the Air Force. No matter where you raise your hand to the recruiting officer, you will soon board a plane, bus or train for San Antonio, Tex., or Geneva, N. Y. No matter what time of night you arrive, you will be met at the station and taken to Lackland Air Force Base or Sampson Air Force Base. And there you will enter a one-story wooden building marked by a sign which reads: "Through these portals pass the Best Airmen of the World's Best Air Force."

Exactly half an hour later you walk out again, not a full-fledged airman, but a fully-processed Air Force rookie. In this 30-minute period you follow a red line marked on the floor to guide you through a series of events which leave you amazed and probably confused.

Here's what happens: The group with which you arrive is divided into those who have had military service and those who have not. These two groups are segregated according to education. The smaller units then are called through processing together. If you are not in the first group called, you are served milk, fruit juice or coffee while you wait. When your group is called, all you have to remember is to follow the red line which zigzags through several rooms.

In the first room you undress and someone hands you two towels and a duffle bag. You wrap one towel around you, stuff the other in the duffle bag and keep moving. The next room is a barber shop where you get the fastest and shortest haircut of your life. The line leads through the shop and into a hot shower. When you come out the other side medics are on hand to give you the milder of your shots and to take your blood type.

Now, you're ready to pick up underwear and fatigue clothing and get dressed. You even see the chaplain for a short talk on activities of your religious faith, and he takes your parents' name and address so he can write home about you.

You're now a basic trainee and you are assigned a flight chief who will guide you through the next 13 weeks of intensive training.

You'll take courses in military courtesy and discipline, administration, atomic, bacteriological, and chemical warfare, guided missiles, organization and functions of the USAF, military law, leadership and training methods, and character guidance.

A unique program is con- (*Continued on page* 151)

'Get The Message Through...'

Radio operator in B-36 communicates with the other aircraft in formation as well as with ground stations.

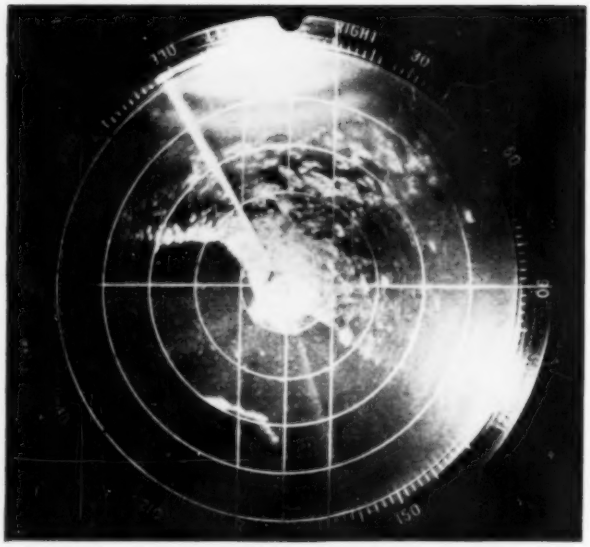
Imagine that the U.S. has just been attacked by enemy atomic bombers. Here is what might happen.

IMAGINE FOR A MOMENT that the sneak attack of an enemy nation has suddenly plunged us into war. The Joint Chiefs of Staff direct the commander of the Strategic Air Force to take action to insure our defense and to launch an attack against the enemy. Simultaneously, according to plans long since made, bombers from widely separated bases take off and fly to enemy targets. The first bomb release is four hours away.

In a short while a message is delivered to the commander. A satellite of the aggressor has broken its ties in the face of potential bombing attacks and has come over to our side. All targets within its borders immediately must be deleted from the current list of priorities. On the situation map is a steadily lengthening line reaching from the base from which our long-range bombers have been launched. Slicing through the sub-stratosphere and closing in rapidly upon our new ally is one of our planes with a load of bombs.

A diversion message with FLASH precedence is placed on the main communications axis, addressed to the target-seeking bomber. The message is converted to perforated tape and is transmitted outward along the main line from tape-relay station to tape-relay station, branching off to a ground-air facility at a key point where it is passed to the operator on duty.

A ground operator takes the message from the hands



This is Los Angeles as it appears on radar screen. Coastline is clearly defined. The blip on lower frame is Catalina Island.

of the supervisor. He cannot fail to note the precedence. He clips it in front of his position and hurriedly consults the frequency plan that was transmitted with the mission order a few minutes earlier and presses a lever on the intercom. "Hey, Joe, Charlie—get this. Put transmitters four, five and seven on the antenna that covers zone B. This is IT."

The ground operator dials the three transmitters in on the frequencies that for the next two hours the airborne operator will be guarding in succession, and starts transmitting the call sign, with the message following. He repeats, and repeats again. When he has finished he logs the message and listens out. In a minute or so he will be able to hear another ground operator repeating the transmission from a point a little further along the axis of communications.

On the mission the bomber's airborne operator is keeping an eye on the clock for frequency changes in accordance with his briefing chart. As he makes his first shift at the appointed time, he hears his call sign down in the "hash." He rapidly shifts back to his previous frequency and barely makes out his own signal in the noise. He shifts up again to the previous channel and turns his receiver to "sharp" reception. He fishes around a moment then hears his call-sign coming in loud and clear.

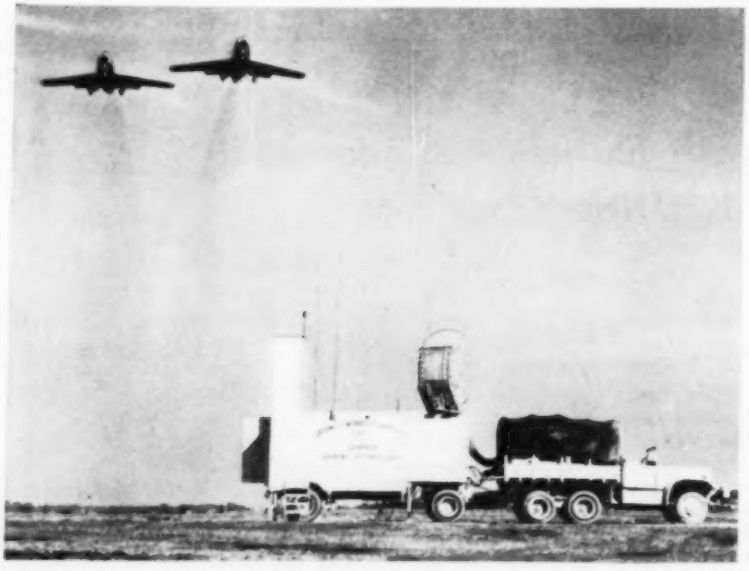
He copies the message the first time over and waits for the repeat to verify the text and the authentication. He consults his code book. No, this is no enemy decoy message, it's the real thing. He acknowledges the message and switches the intercom to "call" position in order to pass the message to the aircraft commander.

Thousands of miles away in the operations room of the Strategic Air Force commander the line on the map showing the progress of the bomber from USAF base toward erstwhile enemy target is now dog-legged toward the secondary target assigned to this aircraft. The worried intelligence officer wrinkles his forehead and mutters, "Well, he got it. There'd have been hell to pay if he hadn't."

Imagined? Certainly, but also quite possible.

Because air operations and air communications are integral, the Air Force communications-electronics mission has been tailored to meet the increasing demands of higher and higher speed air operations, and the challenges of modern electronic warfare. Air Force Communications recognizes the increasing requirements for all weather operations, high altitude blind bombing, precise control for tactical air operations, and offensive and defensive radio and radar countermeasures. There is a primary need for a high speed world-wide communications network. Moreover, it must be flexible. It must serve the rapidly changing requirements of the Air Force commanders so that they may take maximum tactical and strategic action to counter enemy actions and to exploit enemy weaknesses.

To meet the communications requirements of the air age the United States Air Force operates the largest military air communications system the world has ever seen. Some assistance is given by the Army, the Navy and the air forces of our principal allies, (*Continued on page* 132)



World-wide airways system uses ground radar plus electronic navigation aids and some air communications facilities. Above, two F-86's fly over GCA station.

In GCA trailer in Alaska, operators guide an aircraft to blind approach on snowy airfield.

Biggest bomber of World War II was B-29 (left) which cost $640,000. It is dwarfed by the mammoth B-36 (right) which costs $3,500,000.

HOW THE *Air Force Buys A Plane*

TODAY'S COMBAT PLANE weighs twice as much and takes four times as many man hours to build as a typical World War II aircraft.

World War II's North American *Mustang* cost about $53,000. The modern North American *Sabre* costs about $183,000. That's almost a four-time cost increase in nine years.

Back in 1938, the famous *Flying Fortress* got into production. It weighed 65,500 pounds loaded for a combat mission, and it cost about $185,000.

Five years later, the B-29 went into production. It had a combat mission gross weight of 140,000 pounds and cost approximately $640,000.

Today, we have the B-36 intercontinental bomber. This goliath has a top weight of 358,000 pounds and costs about $3,500,000. That's nearly twice as much as the price of the Twentieth Century Limited, complete with Diesel locomotive.

These new planes fly fast, but the steps taken to determine the requirements and to build what the Air Force calls "a production item of aircraft" are taken at a snail's pace. First, the Joint Chiefs of Staff determine the overall mission of the Air Force and set forth this decision in the Joint Chiefs of Staff Plan, which is referred to the Air Force for compliance.

The Deputy Chief of Staff, Operations, studies the document, then passes it on to Plans and Operations, which sends it along to Intelligence to determine target areas—that is, just who, in what parts of the globe, are to receive the attentions of this "production item" or aircraft. Intelligence passes the plan along to Training and Requirements, and to the Assistant for Programming in the Office

One intercontinental bomber costs twice as much as the Twentieth Century Limited.

of the DCS/O. These offices determine factors of attrition and operations. Now the plan is beginning to move in its travels, back and forth across the organizational chart of the Air Force, touching at all points, until the chart finally looks like a railroad map of Ohio. All along the line Intelligence keeps track of the plan, to watch what the aircraft is going to do or what is planned for it to do. At the same time, the Comptroller is jotting down the cost of these various requirements. The Comptroller, a man of power in the Air Force, operates on the overall principle that each department actually requires less money for its part of the project, while each department stoutly maintains that it needs more.

The next step is to determine estimates of limiting resources. Several departments are interested in this procedure. Training and Requirements, Plans and Operations, Procurement and Engineering, Program Standards and Cost Control, Military Personnel and Civilian Personnel all get their teeth into the plan, chew it to pieces and add their pet peeve to it.

Now the plan goes back to Plans and Operations—it has been there before. P&O, as it is known familiarly, now starts to determine composition of the Air Force, which

establishes, by type, the number of strategic and tactical organizations required. This accomplished, the plan limps back to Assistant for Programming, which determines various aircraft program planning factors, finally coming up with first-line aircraft inventory requirements by type.

That accomplished, Programming wipes its brow and determines numerical procurement requirements by aircraft type and model, then shoots the plan to the Office of the Comptroller, who by this time is getting fed up with the whole affair and adds a memorandum called officially, "Estimate of Budget Limitations." What it says in polite officialese is, "Listen, we have just so much dough for *everything*. You can't spend it *all* on one airplane."

The Comptroller watches the plan staggering along the Pentagon's unending corridors to Procurement and Engineering, which estimates a schedule of production capabilities, which they know by heart. Then the plan is sent along to Division of Requirements, DCS/Development, who by this time is sufficiently read in on the problem to make a tentative selection of the plane as a desired model. Training and Requirements determines whether they can train anybody to fly the thing.

Now, Procurement and Engineering in the Office of Deputy Chief of Staff, Materiel, studies established recommended procurement schedules, within estimated budget and production capabilities. To arrive at this step, P&E shoots the plan sideways, in two directions—left to the Assistants for Programming and Training and Requirements, and right for a budget check in the office of the Comptroller.

After T&R, A for P (Assistant for Programming) and Budget have done their work, the plan goes to a Board of Senior Officers, which must review all that has gone before and which may concur in tentative model selection and recommended production schedule. If they do, then back the whole affair staggers for another budget check. There is a presentation, defense, and recalculation of the budget through the Secretary of Defense and Bureau of the Budget.

There have been 12 main steps so far in a forward direction, with numerous side-steps in between for this or that, until finally the bedraggled plan is sent to the Bureau of the Budget and thence to the Congress. Thereafter, if all goes well and the nation is not suffering one of its recurring spasms of retrenchment, appropriate legislation is passed by Congress and apportionment of funds by Bureau of the Budget to the Air Force is authorized.

And that is the procedure in determining requirements of a production item of aircraft. What has been determined is: Do we need another model of airplane? If so, what is it to do? What kind of airplane must it be in order to do it? Can we build it? In what space of time? And can we pay for it? This procedure may take from a week in very urgent cases to several months.

After the requirements of a desired model have been approved and construction authorized and appropriated for, the aircraft industry comes into the picture officially—although it may have been working hard at the problem for some months previously. Some manufacturers work for a period of time on a verbal agreement—or "Letter of Intent"—to be followed by a formal written okay within a period of three months to a year. In fact, the industry often takes a chance, (*Continued on page* 157)

COMPARATIVE COSTS OF WARPLANES

North American F-51

1942
$53,000

North American F-86

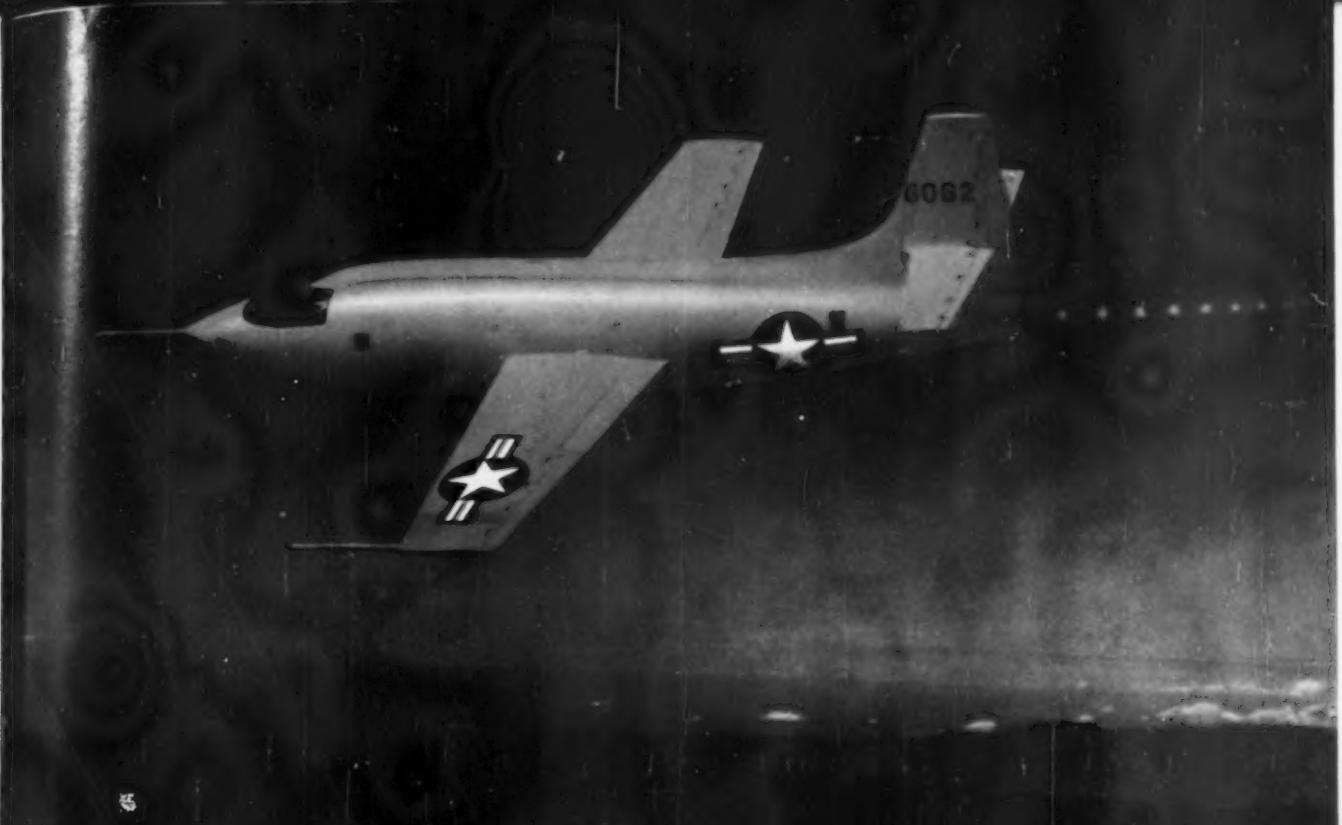
1951
$183,000

Boeing B-29

1943
$640,000

Convair B-36

1951
$3,500,000



Bell X-1 was first U. S. plane to fly faster than sound. Experimental rocket craft has 1,000-m.p.h. top speed.

North American B-45, now in Air Force squadron service, was the first heavy U. S. multi-engined jet to fly.

familiar Boeing transport/freighter gets new job and new name.
As flying tanker, called KC-97A, it refuels long-range B-47s.

Key members of new command are Dr. Merwin J. Kelly, technical adviser; Maj. Gen. David M. Schlatter, commanding general, and Donald Quarles, management adviser.

A New Command Is Born

The revolutionary aerial refueling development is typical of projects to be controlled by new command.

THE AIR FORCE is taking science into partnership today on a larger scale than ever before. A new organization, concerned exclusively with scientific research and development, will be established on May 15 as a major independent command. The Air Research and Development Command (ARDC), will take its place among the major commands of the Air Force and on the same level as the Strategic Air Command, Air Materiel Command, Tactical Air Command, Air Training Command and other major independent commands.

Eventually all research and development activities of the Air Force will be assigned to it, with Maj. Gen. David M. Schlatter as its commanding general. This will be the primary source of scientific and technical information pertaining to the Air Force research and development program and will provide the Air Force with its advanced designs in aircraft, guided missiles, electronics, armament, and other equipment. More than 1,500 civilian and military personnel will be assigned to the headquarters—a majority of whom will be civilian scientists and technicians.

Bases and activities currently or eventually expected to be assigned to ARDC include: the Electronics Development Center at Griffiss Air Force Base, Rome, N. Y.; guided missile testing at Holloman Air Force Base, New Mexico; Air Force Cambridge Research Laboratories, Cambridge, Mass.; Edwards (formerly Muroc) Air Force Base, Calif.; the Arnold Engineering Development center, Tullahoma, Tenn.; the Long Range Proving Ground, Patrick Air Force Base, Fla.; and the Air Materiel Command's Engineering Division, Flight Test Division, and All-Weather Flying Division located at Wright-Patterson Air Force Base, O.

During the recent organizational period of ARDC, temporary headquarters have been established at Wright-Patterson Air Force Base and ARDC is temporarily assigned to the Air Materiel Command for organization and manning.

A permanent headquarters location will probably be announced prior to the time of publication of this issue of FLYING. END

DEVELOPMENT

Air Force of Tomorrow

Surface-to-air missiles, equipped with target-seeking warheads, would be deadly threat to attacking planes in a future air war.

Rocket propellants such as aniline and nitric acid all require protective clothing for the men who handle them.

Push-button warfare isn't here as yet but the Air Force is moving toward it.

SOMETIME in the 1960's a reporter might write a story starting something like this:

"The Air Force today demonstrated its new intercept system to a group of visiting Congressmen, Defense Department officials and newsmen.

"In a darkened underground chamber, the observers gathered before an illuminated radar screen. For a few minutes the screen remained blank. Then, on the left appeared a small spot of light, moving steadily across the screen, which was calibrated in hundreds of miles.

"This spot was a guided missile, out of sight and out of sound, bearing a mock atomic warhead, and approaching the coastline with supersonic speed. Seconds passed as the deadly spot maintained its inexorable pace. Suddenly, from the other side of the screen burst a second and smaller spot—the counter-missile. It moved swiftly to the left and upward, guided on a collision course by electronic eyes and ears.

"The two spots neared. They touched. There was a flash of light on the screen and then it went blank. Missile had met missile and both were destroyed."

A story for science fiction writers? Not at all. This is a realistic forecast of the capabilities of the Air Force of the future. Predictions of the Air Force of Tomorrow have been taken out of the guesswork category by Air Force and civilian scientists who know what is possible with today's store of scientific information and what additional discoveries are necessary to achieve the "impossible."

These scientists, with their supporting staffs, are under the supervision of the Deputy Chief of Staff for Development. They know that future conquests in the air will be won first in the laboratories and on the proving grounds. So they are exploring the boundaries of scientific knowledge for new ideas and new weapons; evaluating and testing new equipment; establishing performance standards for men, weapons and equipment that will be required for air supremacy three, five, 10 or more years from now.

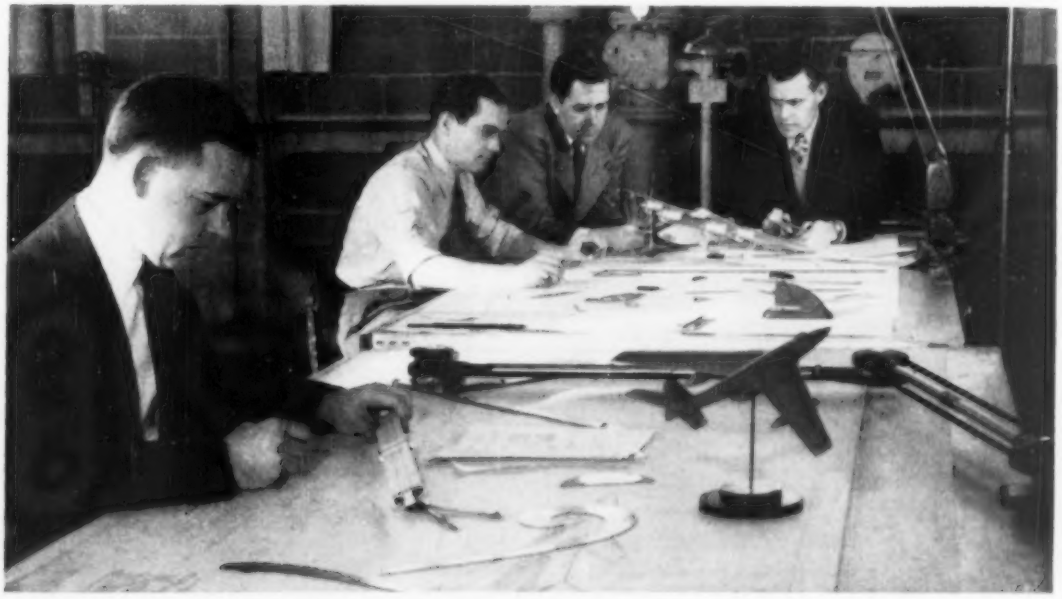
Such systematic search for new weapons and methods is relatively new in military history. From the days of battle axes and spears, weapons have been developed and used haphazardly. Not until the eve of World War II did the United States throw its total technical and scientific resources into a war effort. And not until 1950 did the United States Air Force reorganize its staff so that maximum effort could be put into research and development.

In World War II, air research was the responsibility of the Army. From the time the Air Force was made independent until early in 1950, research and development work was performed in at least 10 divisions of the Air Force. Responsibility for this critical task was dispersed among officers whose principal concern was operations, supply, maintenance, training, medicine or any one of half a dozen other specialized areas.

Research and development lagged. Gen. Hoyt Vandenberg, chief of staff, recognized the problem and called on some of the nation's best minds to help find a solution. Separate studies (*Continued on page* 171)

Remotely-controlled gun turrets are part of Air Force development. Here fire control engineer tests system in AF lab.

Ramjet engines burn lots of fuel but have high speed. Engineer (right) supervises 30-inch subsonic ramjet on test run.



The missiles and supersonic planes of tomorrow are on the drafting boards of today. With Air Force supporting both basic and applied research, techniques of developing new weapons and methods are new in military history.

AIR MATERIEL COMMAND

Home of the Top Secrets

Buyer for the Air Force, tester, researcher —those are the big jobs at Wright Field.

ON a stretch of flat farm land covering 10 square miles outside Dayton, O., is one of the world's greatest aviation research institutions. Here at Wright Field are hangars, airfields, wind tunnels, laboratories and block-long office buildings. It is an enormous complex of equipment, men and know-how dedicated to making the planes of the U. S. Air Force fly faster, farther, higher, longer and more often than those of any other nation in the world.

In this three-quarters of a billion dollar research center there are more than 3,000 active projects underway. It would take 10 encyclopedias to write about them, and the detailed reports of the findings that have been turned up at Wright Field would fill a library.

This is the home of the Air Materiel Command and it is concerned with nearly everything that touches the Air Force. From atomic engines down to the kind of food to put into a survival kit, from supersonic wind tunnels to protective clothing for the men who handle the poisonous rocket fuels like aniline and nitric acid, the AMC has its hand in.

The full-page picture on page 86 shows a flying tanker refueling a Boeing B-50. AMC has now developed a new hydraulically-operated refueling pump that can do the work of eight electric pumps—and do it twice as fast. This first hydraulic refueling pump to be used by the Air Force will slash in half the time required for the ticklish in-flight refueling operation. It will also save weight.

Wright Field, once called the nerve-center of air power, is undergoing a revolution in power today. One of its primary purposes when it was built in 1927 was to test the then-conventional reciprocating engines. The development of jet engines meant taking out the installations founded around the propeller and piston engine and gearing the new ones to the turbine and tailpipe.

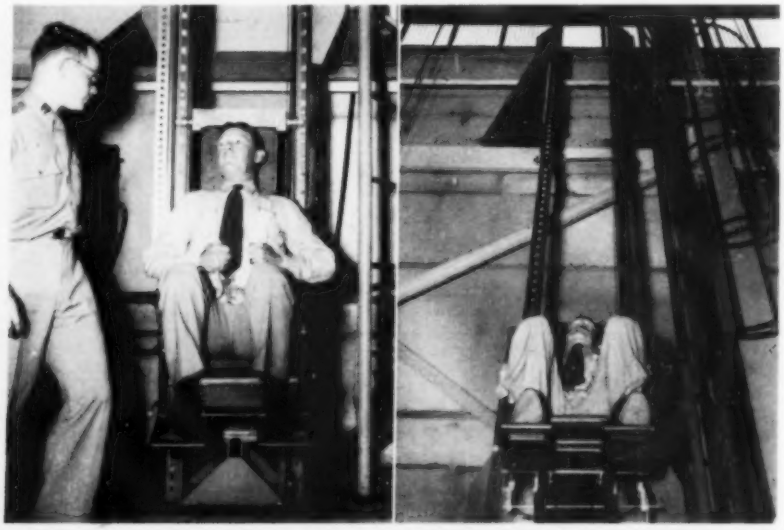
One engineer explains: "Ten years ago, 100 per cent of our work was with reciprocating engines. Today 90 per cent of our effort is with jet engines of all types. There is only one reciprocating engine project still on the active list—the big "4360" which is going into the B-36 and the B-50 bombers."

Before the war the big engine argument was inline vs. radial engines; liquid-cooled vs. air-cooled engines. That battle is obsolete. Today it's axial-flow jets vs. centrifugal-flow jets. Even this battle is about won—by the axial-flow jets.

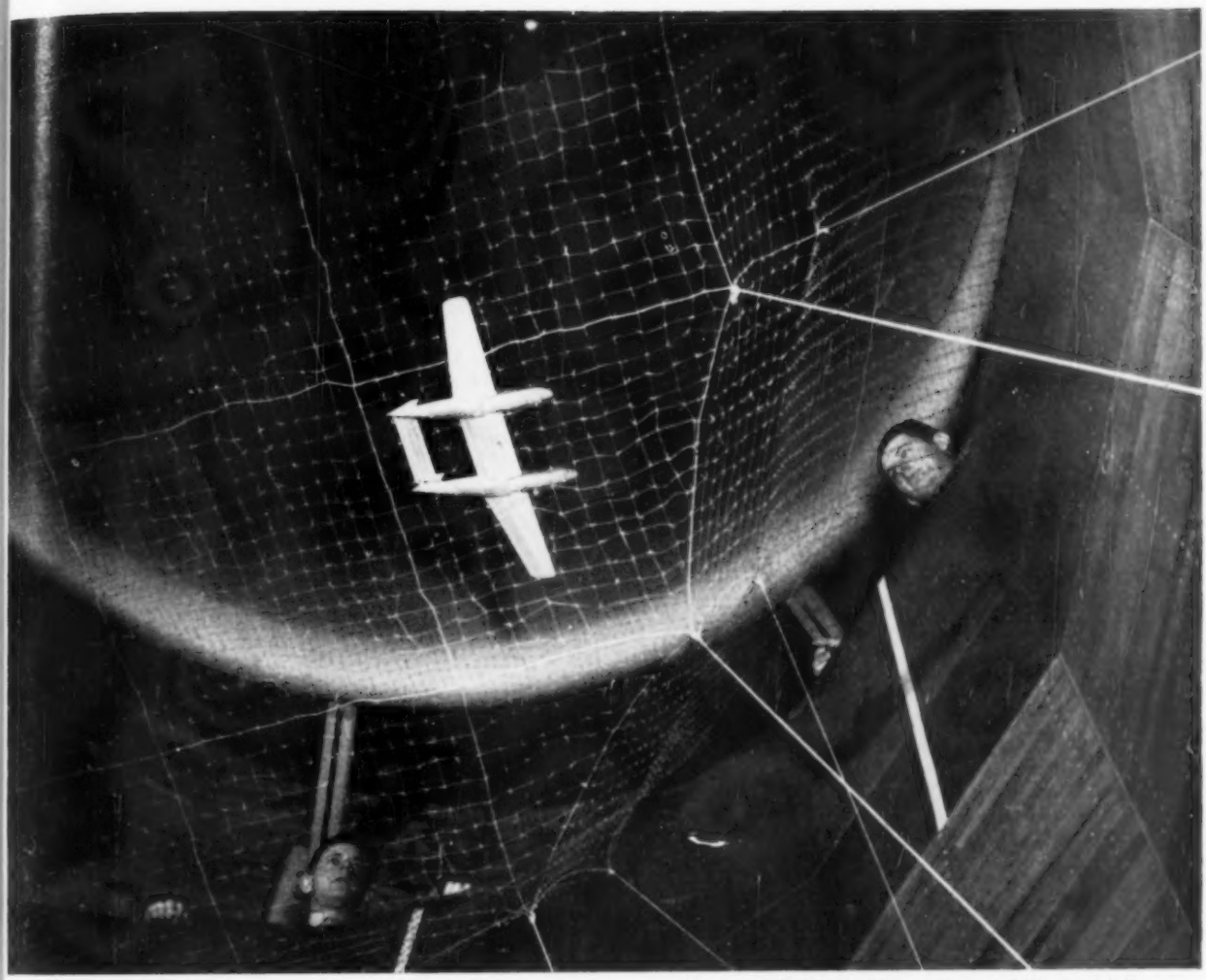
Wright Field is the home of change. In a few years the jet testing facilities and the 500-1,000-m.p.h. airplane testing facilities built around the jet may be as obsolete as the facilities built around the reciprocating engine and its slower airframe. One of the hush-hush projects now underway is that of monitoring the Air Force's program for atomic aircraft engines. Today AMC is a focal point in the NEPA program.

Wright Field is not the only home of the Air Materiel Command, however. AMC is backed up by eight Air Ma-

Automatic opening parachute is one of AMC developments. Capt. C. G. Whitney points to handle which pre-sets device.



Shell ejection seat used to catapult pilots out of fast-moving jet planes was first proved in Wright Field laboratories. Here Maj. Gen. L. C. Craigie tests seat in aircraft lab. Combination of seat ejection and automatic parachute (left) is tremendous safety advance.



Vertical wind tunnel provides unique opportunity to study plane models in free flight. Precision-engineered F-82 model falls into a nylon net stretched across base of tunnel during Wright Field test. This is the world's largest and fastest such tunnel.

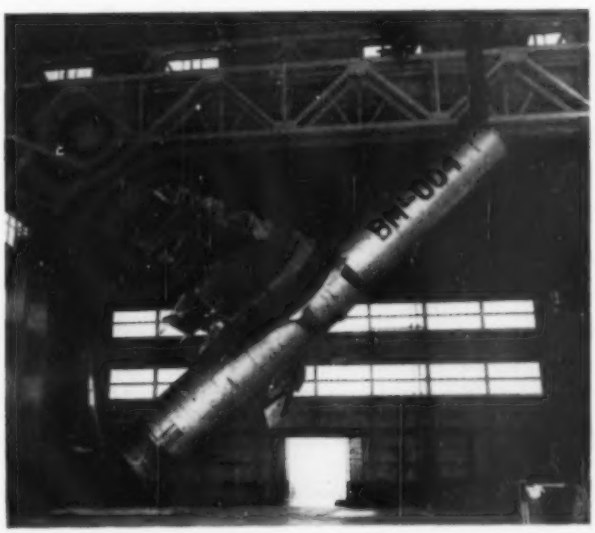
teriel Areas located in Pennsylvania, Georgia, Alabama, Texas, Oklahoma, Utah and California. Area headquarters carry out the over-all AMC program in their own localities and have jurisdiction over depots and other local installations. In addition, there are 21 other installations.

AMC plays a vital part in supplying the Air Force. All of the requirements for the hundreds of thousands of items needed are computed by the Supply Division at AMC headquarters. More than $8,000,000,000 worth of supplies and equipment of all kinds are in the hands of USAF throughout the world.

AMC also maintains this materiel. Base units are authorized to make minor repairs and adjustments but major overhaul and modification of planes, equipment, accessories, vehicles and field communication systems come under the jurisdiction of the Air Materiel Command.

AMC buys materiel and also works with industry in planning to produce it. Its Technical Intelligence Division gathers information from its own laboratories and other sources to help in creating new equipment. All new aircraft must prove themselves in AMC labs and flight tests before they can be accepted by the Air Force.

Here are some of the things (*Continued on page* 150)



Static-testing B-36 bomber. Stripped of nose, tail assembly, crew compartment and engines, plane was strained to destruction point after almost two years of tests in huge hangar.

SPECIAL WEAPONS COMMAND

Sunday Punch

Special weapons crew checks its maps and data before taking a new North American B-45 four-jet light bomber on a test mission.

Secrecy shrouds the men who test the nation's atomic weapons.

THE SKIES were clear over Japan on that now historic day early in August, 1945. The city of Hiroshima was awakening after the luxury of a night uninterrupted by the drone of B-29's overhead. The few Japanese who noted the sudden appearance of a small dot in the wide expanse above showed little concern. A single airplane, probably reconnaissance, was no cause for worry. But a few moments later, with a flash equal in brilliance to the sun, and a thunderous roar never before heard by mankind, came the explosion—an atomic explosion.

This was the dramatic and horrible spectacle which introduced to the world a military application of atomic energy.

During the research and development stages preceding the dropping of the A-bomb it was anticipated that the military and political implications of the end product would be enormous. All activities were secret and the number of persons knowing about the program was kept to a minimum. Even during the practice dropping of dummy A-bombs in Utah, B-29 crews of the 509th Bomb Group had no inkling of their mission other than that they were to take off, drop their mysterious cargo on a predetermined target, return home and report the results —time and time again.

Prior to the first combat use of the atomic bomb over Japan a few men had labored to construct the A-bomb within the framework of the super-secret Manhattan Project. As the program snowballed with the dropping of the second bomb on Nagasaki, an Atomic Energy Commission (AEC) was formed with David Lilienthal at the helm.

Under the jurisdiction of the Atomic Energy Commission was placed, among other things, the control of all critical atomic energy information which was termed "Restricted Data." The security situation was ticklish to say the least because two opposed desires were involved. On the one hand was the desire (*Continued on page* 162)

Jet interceptors like these F-86's at Kirtland AFB are ready to stop unidentified planes flying within 150-mile radius of Los Alamos.

Six-engined Stratojet is one of planes tested as atom bomber. It flies over 600 m.p.h. Other giant bombers tested by Special Weapons Command include the B-29 (world's first atomic bomber), the newer B-50, and the mammoth intercontinental bomber, the 10-engined B-36.

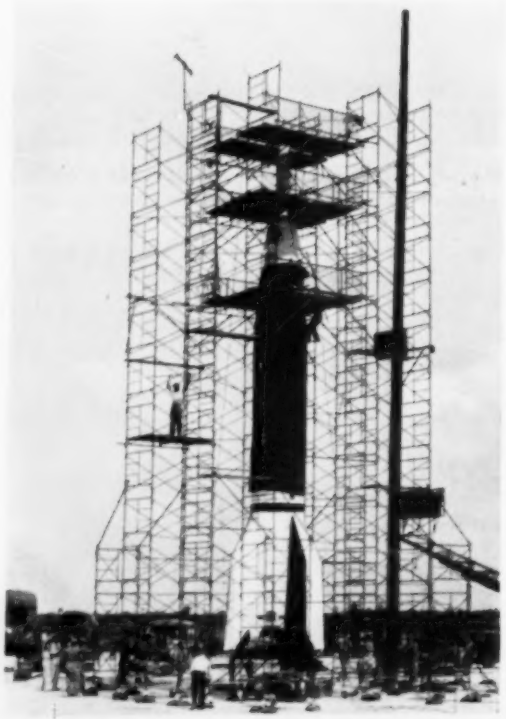
The Sabres, America's fastest operational jet planes, are the only jet interceptors based within 100 miles of the vital atomic center.

LONG RANGE PROVING GROUND

Guided missile range thousands of miles long is provided over Atlantic from new Patrick Air Force Base on Cape Canaveral, Fla. Instrument stations are now being established on Bahamas.

Where Guided Missiles Fly

Only an ocean range has enough unhampered expanse to test guided missiles of tomorrow.



Launching pad is beehive of activity as preparations for firing proceed. The pad has a complicated system of tunnels which connect to massive concrete buildings.

EARLY ONE EVENING last summer, a Florida farmer called a local newspaper to report that he had just seen a "flying saucer" hovering over Cape Canaveral, a desolate nose of land which profiles out of Florida's central east coast.

The report was made on Wednesday, July 26. It almost had to come. Just two days previously, the significance of Cape Canaveral had changed so dramatically in the minds of native inhabitants of the region that at least one aerial illusion was in order.

This is what happened on the lonely Cape at exactly 0929 hours, Monday, July 24, 1950:

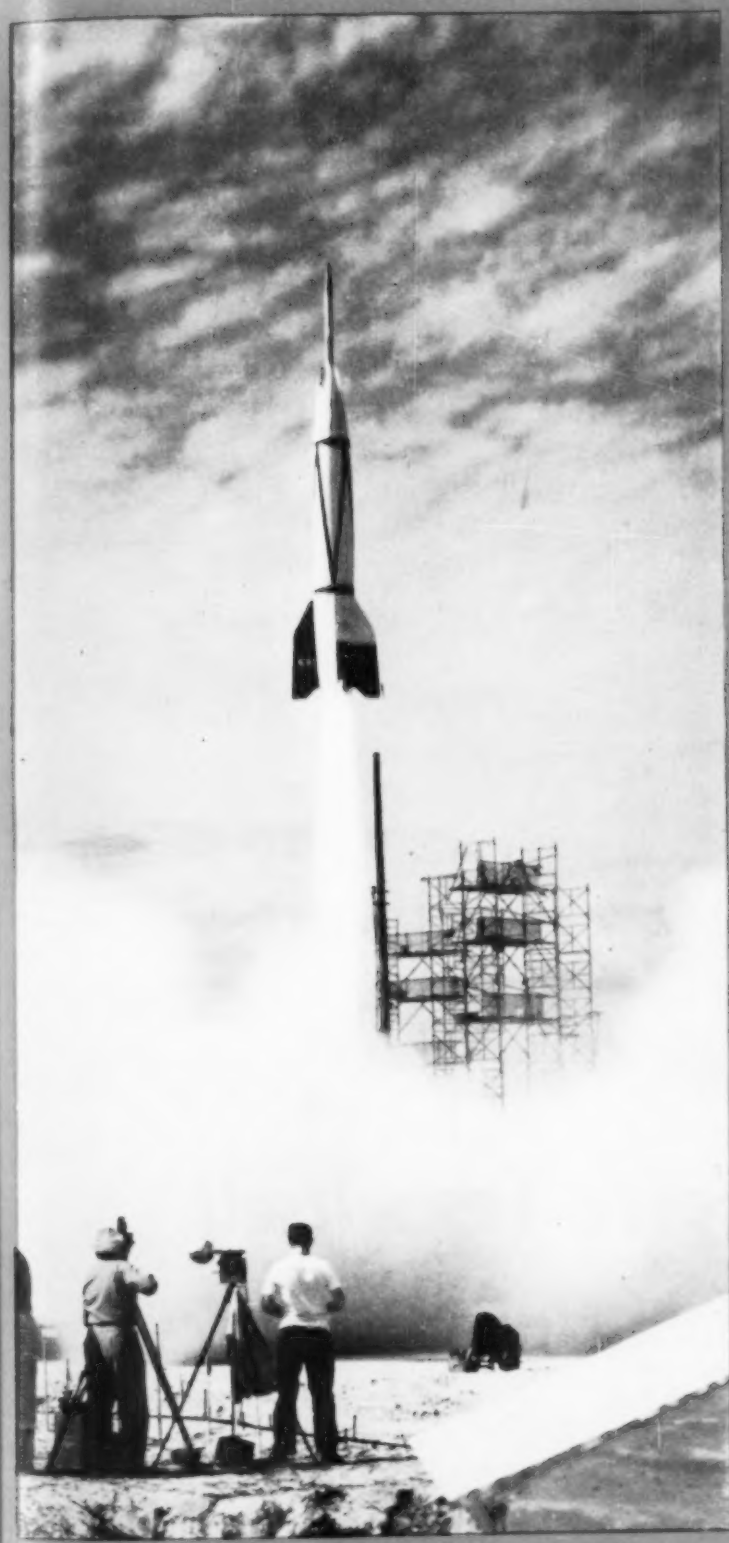
A German V-2 rocket, carrying the American *Wac Corporal* missile in its nose, rose vertically from a concrete slab in the midst of a palmetto-brush waste and seemed to rest its 14-ton 56-foot length for a moment on a pillow of fire, smoke, and thunder.

Seconds later, the huge missile was tracing a "beautiful trajectory" toward horizontal flight as it passed through clouds 20,000 feet above the Atlantic.

Then, 63 seconds after being launched, while flying approximately 2,660 m.p.h., 15 miles out and 51,000 feet over the ocean, the V-2 "bumped off" the *Wac Corporal* which fired ahead on an independent flight, the details of which are classified information.

Slightly more than one minute later, the unburdened V-2 destroyed itself in flight in obedience to a radio signal from Cape Canaveral. Debris of the missile dropped 48 miles at sea only 2 min. 20 sec. after it had lifted its great bulk over the Florida coast.

This was the flight of the Army Ordnance Department's "Bumper No. 8"—the first guided missile ever launched from the facilities of (*Continued on page* 140)



Rocket called Bumper No. 8 takes off from launching pad at proving ground. The rocket was a German V-2 with an American Wac Corporal in its nose. After 63 seconds of flight the Wac Corporal was fired and the V-2 destroyed itself.

The rocket started out slowly, soon gained speed. Sequence progresses to show missile beginning to turn from vertical to near-horizontal flight. Bumper was step-rocket, so named because Wac Corporal was "bumped" off when rocket was already traveling at high speed. Performance is classified.

Not in Alaska, but in Eglin's private "weather factory," these technicians inspect F-86 that is undergoing cold-weather testing.

AIR PROVING GROUND

The Air Force Tests Itself

FAR ABOVE the blue reflection of the Gulf of Mexico a crewless B-17 droned through the skies. In a nearby plane, men with binoculars squinted through the haze and gave radio directions which the old bomber obeyed like a huge mechanical toy.

Meanwhile, low over the scrub forest of the Eglin (Fla.) Air Proving Ground Reservation, a sleek, long-nosed F-94 all-weather fighter folded its wheels into place and pointed into the sky. The F-94 pilot, his vision completely obscured within a hooded cockpit, guided the jet fighter solely by directions which came through his earphones from a radar installation on the ground.

In the fighter's rear seat, a radar operator watched tensely for the first sign of the B-17 on his radar screen.

Far beneath them on the air base at Eglin, a ground controller looked at his radar scope and saw the two planes in the air, miles above him. He could see a bright pip that indicated the old B-17, slogging along on what was to be its last flight. He could also see the new jet practicing the job it might have to do in war—to find and destroy enemy aircraft in darkness and bad weather.

Here was a 600-m.p.h. jet fighter being guided through the skies by two men who couldn't see the actual scene of flight.

The ground controller picked up his microphone and spoke to the jet pilot, telling him just where the bomber was in relation to the F-94. The controller gave him an exact compass course to fly, then changed the course

Air battles rage constantly over Eglin, but it is just practice for the real thing.

slightly to correct for relative changes in position of the two aircraft.

"You should be picking it up now," he said to the radar operator in the fighter. And in a few moments the plane's radar operator announced, "Got him!"

The controller on the ground then turned over his guidance of the pilot to the airborne observer, whose radar-scope had too short a range to pick up the bomber at a distance. The radar operator in the F-94 directed the pilot over the intercom phone. "Turn right five degrees," he said. "A little more right. He's 30° above you. Climb at a five degree angle."

With his eyes fixed on his instrument panel, checking compass, speed, and rate of climb, the pilot sat there waiting—a blind man flying through blackness at 10 miles a minute, guided by another man who saw only a streak of greenish light on a glass screen.

"See him yet?" the radar operator asked the pilot, who by now was watching his own smaller radar-scope—one with much less range than the observer's. After a few minutes the pilot said, "Got him!" Then he took over and followed the image on his own scope.

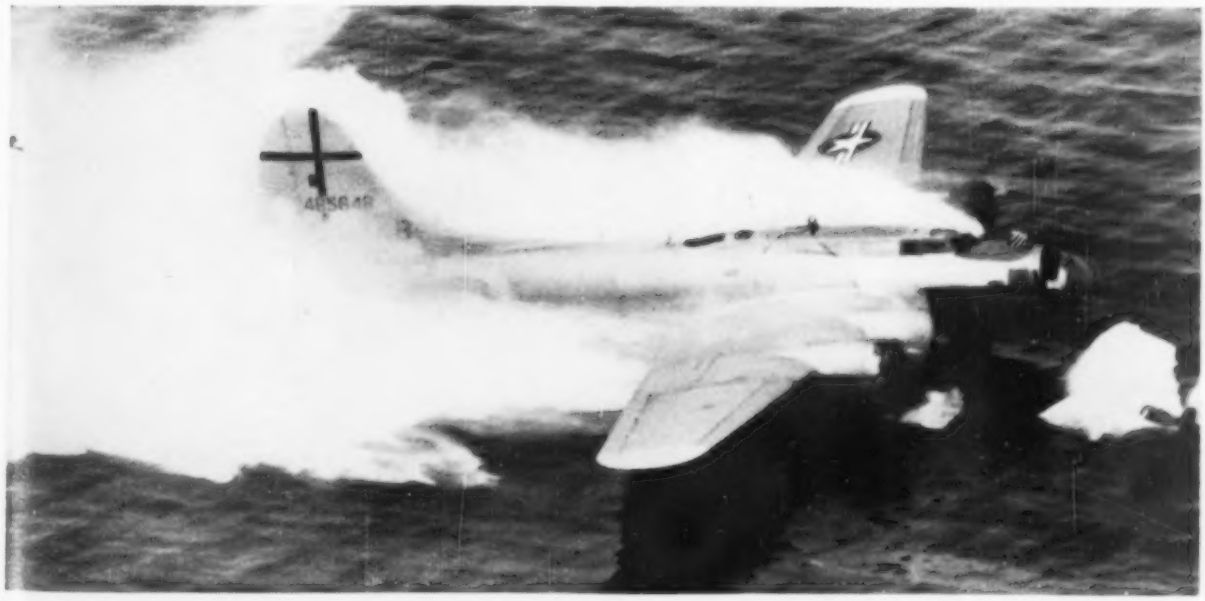
He knew the precise moment, as the planes flashed closer to each other, when he must fire two short bursts —all that he had time for before his jet whizzed past the bomber. He turned, came around, and again fired a burst or two into his target.

Flames shot from the left inboard engine of the B-17. The bomber fell out of control, spiraled into a steep dive, and plunged into the sea.

The pilot had shot down a (*Continued on page* 155)

Skies over Eglin are filled with bright yellow parachutes as 448 paratroopers hit the silk in mass jump demonstration.

Crew loads 24 five-inch rockets on F-84 for Proving Ground tests. Rockets give punch equal to salvo of 30 five-inch guns.



Radio-controlled B-17 hits water in Eglin ditching operation. Air Force standard ditching techniques are developed from tests like this. Note propeller (just ahead of plane) and pieces of engine cowling that were torn loose by force of impact.

WOMEN IN THE AIR FORCE

THE *Glamour Corps*

Women have invaded all of man's activities, even war.

DAYS OF THE YOUNG MAIDEN waving her sweetheart off to battle and then retiring weepily to pine away until his return are becoming a part of the past. Now the young woman is just as likely to pack a few clothes in a suitcase, kiss her parents goodbye, and pull out on the evening train—bound for Texas and the Air Force.

En route she is likely to meet girls from Wisconsin, California, New Hampshire, and Idaho—all on their way to start a new Air Force career. This trip to Lackland Air Force Base, San Antonio, is just the beginning of a tour of duty that may take them to Tokyo or Paris—or wherever else the Air Force serves.

When WAF recruits arrive at Lackland they are assigned to a training squadron and issued the smart new blue uniforms. The girls are then quartered in the WAF area, an almost completely self-sufficient unit with a theater, chapel, swimming pool, mess hall, modern barracks and, of course, a beauty parlor.

After a day or two of getting settled, making new friends, and beginning to get the feel of life away from home, the recruits are ready for processing. This involves medical and dental inspections, inoculations, a talk with the chaplain, and the checking of individual records.

A smart salute is returned by a WAF during inspection at Bolling Air Force Base in Washington, D. C. Women in the Air Force have same rights, privileges and responsibilities as airmen, do most of same jobs, except that they do not serve as pilots or go into combat.

Then comes the real beginning of the new career—basic training. Individual classes are kept down to about 60 women. The course is divided into six departments which include general orientation, lessons in military correspondence, training for inspections and parades, aircraft spotting and the fundamentals of the Air Force in operation.

During this initial training period, which varies from eight to 11 weeks, each woman takes a number of aptitude tests which will determine the work for which she is best suited.

One of the most popular parts of life at Lackland comes after classes in the evenings, when the newly-formed WAF squadrons are the guests of airmen training at the base. Other recreational facilities include group singing, swimming, movies and music.

The modern idea of women in uniform began in 1942 when a women's corps was organized as an auxiliary of the United States Army. Officially it was called the Women's Army Auxiliary Corps (WAAC). Then came the Women's Army Corps (WAC) and, later, when the Air Force became a separate service, the Women in the Air Force (WAF).

Like all beginnings, the initial days of women in the service were full of difficulties—some humorous, some serious. An officer calling down an airman under his command might be confronted with a female Sergeant Doakes who showed unmistakable signs of tears. The nonplussed CO might have a hard time deciding whether to be a comforting male or a disciplinary officer.

Dental assistant (top) and typist (left) have completed training and hold regular jobs in two of the Air Force's 42 career fields. WAF's also serve in such jobs as parachute rigger, radio operator, cryptographer, aircraft dispatcher.

There were more serious questions. What jobs could women be expected to take? Could they work satisfactorily side by side with men? Could they stay in service if they married and had children?

These worries and doubts soon vanished. Experience, practice and common sense combined to eliminate inefficiency, awkward moments, and uncertainty. It was discovered that women could lend themselves to discipline as easily as men. With the exception of jobs demanding great physical strength, women could handle nearly every job in the Air Force. Marriages did take place but this did not affect the position of a WAF unless she had a baby, in which case she received an honorable discharge.

At no time is any favoritism shown for the so-called "weaker sex." The women qualify, train, compete and are assigned to jobs on the same basis as airmen and officers. Since June, 1948, when the Women's Armed Service Act was passed, the WAF's have been provided with equal rights, privileges and responsibilities granted to men. There are only two exceptions; WAF's cannot serve as pilots and they cannot go into combat.

This practical co-educational policy is a far cry from the early days when women in military service were thought to be suited only for such jobs as cooks, clerks, stenographers (*Continued on page* 149)

Girls relax after work. Attractive WAF rooms, with flounces along shelves and flowered bedspreads, are unlike usual military barracks.

MATERIEL

Planes, Bases, Supplies . . .

It's a tough job to keep track of 600,000 separate items that are worth 5.3 billion dollars.

AIR FORCE PLANES fly from the tropics to the polar regions, through the entire range of climatic conditions and temperatures, and reach into the rarified atmosphere of unexplored altitudes.

Such activities present constant problems to the Office of the Deputy Chief of Staff, Materiel—the office of the Air Force primarily concerned with logistics.

In its broad, simple sense, the job of the DCS/M covers all activities necessary to build, support and maintain the Air Force.

In World War II, more than ever before in military history, the course of the conflict was conditioned by the weight of materiel massed on the battlefronts. The ability to mass materiel, rather than men, in a given area became the governing factor in preparing for an offensive.

To fight a successful war a vast amount of planning has to be done beforehand. Sometimes this planning continues for years, subject to changes as the international situation varies. The five directorates of the DCS/M have the job of comprehensive logistical support of the Air Force.

● The Directorate of Logistics Plans studies all USAF operational plans to see whether they can be implemented from a logistic viewpoint. Then it makes the logistic preparations necessary to carry out the war plan. Troops have to be fed, clothed and housed. Equipment must be delivered at the right time and to the right place.

You can't send airplanes to operate from a field in Podunk, for example, unless arrangements have earlier been made to have supplies and equipment there. And, when making advance arrangements, you have to know what type of planes will use the field, whether fighters or bombers.

● The Directorate of Procurement and Engineering decides what materiel is needed after the Joint Chiefs of Staff have determined the mission of the Air Force for a given period.

By referring to numerous sources, the directorate determines that a medium bombardment group will have so many aircraft per squadron and so many squadrons per group. From other sources, the first-line annual replacement for medium bombers is found to be so many per month. And then the directorate determines that so many new aircraft per year will be needed to keep the group modern.

In this manner, annual new production requirements for all aircraft are determined. Then comes another job —scheduling production and fitting the quantities of planes needed within the Air Force budget.

Stated in terms of quantities and models, the programming data looks simple. An aircraft program may consist of as many as 20 models. But that doesn't mean that it takes only 20 contracts to implement this program. There will, of course, be 20 airframe contracts; but there are also literally hundreds of other contracts to provide engines, armament, electronics, and other equipment, which are procured by the Air Force and then shipped to the airframe contractor for installation.

● The Directorate of Installations provides the engineering management spearhead and the technical follow-through necessary to acquire, construct and maintain Air Force bases from which planes and airmen may operate.

Installations are complex. Sometimes the base which is best from a strategic viewpoint can't be supplied logistically. Other base

(*Continued on page* 140)

Wartime logistics presents mammoth problem. Here, supplies and equipment are piled on Hungnam, Korea, beach. Later they were shipped south, used for offensives below 38th Parallel.

PLANES
of the
UNITED STATES AIR FORCE

Eleven pages of facts and photos compiled by the editors of Flying.

DOUGLAS B-26

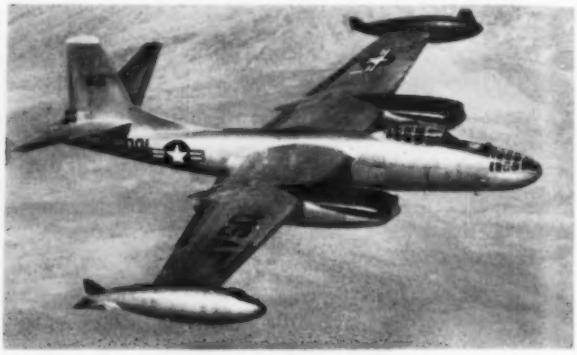
Powerplants: two Pratt and Whitney R-2800-79 (2,370 h.p. each). Span 70 feet, length 51 ft. 4 in., height 18 ft. 6 in. Top speed 372 m.p.h. Range (with combat load) 1,740 miles. Service ceiling 28,000 feet. Gross weight 37,740 pounds. Crew: three. (Data given for B-26C.) Popular name: Invader.

BOEING B-29

Powerplants: four Wright R-3350-57 (2,200 h.p. each). Span 141 ft. 3 in., length 99 feet, height 27 ft. 9 in. Top speed 351 m.p.h. Range: over 4,600 miles with 10,000 pounds of bombs (normal bombload 20,000 pounds). Service ceiling over 35,000 feet. Gross weight approximately 135,000 pounds. Crew: 10-14. (Data given for B-29A.) Popular name: Superfortress.

CONVAIR B-36

Powerplants: six Pratt and Whitney R-4360-41 (3,500 h.p. each) plus four General Electric J-47 turbojets (5,200 pounds thrust each). Span 230 feet, length 162 feet, height 46 ft. 9 in. Range: 10,000 miles. Service ceiling: over 45,000 feet. Gross weight, 358,000 pounds. Crew: 15 (Data given for B-36D.) Popular name: none.



NORTH AMERICAN B-45

Powerplants: four General Electric J-47 turbojets (5,200-pounds thrust each). Span 89 ft. 6 in., length 74 feet, height 25 feet. Speed: in 550 m.p.h. class. Combat radius: over 800 miles. Service ceiling: over 40,000 feet. Gross weight: 82,600 pounds. Crew: four. Bombload: over 10 tons. (RB-45C reconnaissance version has combat radius over 1,200 miles, five camera stations.) Popular name: Tornado.

BOEING B-47

Powerplants: six General Electric J-47 turbojets (5,200-pounds thrust each). Span 116 feet, length 108 feet, height 28 feet. Top speed: over 600 m.p.h. Range: over 2,000 miles. Service ceiling: over 35,000 feet. Gross weight: 185,000 pounds. Crew: three. (Data given for B-47A.) Popular name: Stratojet.

BOEING B-50

Powerplants: four Pratt and Whitney R-4360-35 (3,500 h.p. each). Span 141 ft. 3 in., length 99 feet, height 32 ft. 9 in. Top speed: over 400 m.p.h. Range: 6,000 miles. Service ceiling: over 40,000 feet. Gross weight: 164,500 pounds. Crew: 11. (Data given for B-50D.) Popular name: Superfortress.

MARTIN XB-51

Powerplants: three General Electric J-47 turbojets (5,200-pounds thrust each). Approximate dimensions: span 55 feet, length 80 feet, height 17 feet. No official figures released on speed, service ceiling, armament, bombload, gross weight or range. Combat radius: under 1,000 miles. Crew: two. Designed for ground support. Provisions for RATO, and parachute deceleration on landing. Popular name: none.

No Photograph Available

BOEING XB-52

Designed as all-jet replacement for B-36, the heavy B-52 is outgrowth of B-47 six-jet medium bomber. Plane will have range of over 6,000 miles but no other details have been revealed. It will go into production without extensive flight tests and deliveries will begin this year. Two experimental models built by Boeing will be ready this fall but at press time no manufacturer had been designated for production.

NORTH AMERICAN F-51

Powerplant: one Packard-built Rolls-Royce V1650 (over 2,000 h.p.). Span 37 feet, length 33 ft. 4 in., height 12 ft. 7 in. Top speed: over 460 m.p.h. Range: 1,700 miles. Service ceiling: 42,000 feet. Gross weight: 11,000 pounds. Crew: one. Armament: six 50-cal. machine guns; can carry 10 five-inch rockets or two 1,000-pound bombs or napalm tanks. (Data given for F-51H.) Popular name: Mustang.

LOCKHEED F-80

Powerplant: one Allison J-33-A-23 (5,200 pounds thrust). Span 38 ft. 10½ in., length 34 ft. 6 in., height 11 ft. 4 in. Top speed: over 600 m.p.h. Range: 1,470 miles. Service ceiling: 45,000 feet. Gross weight: 15,336 pounds. Crew: one. Armament: six 50-caliber machine guns. Bombload: two 1,000-pound bombs or eight five-inch rockets. (Data given for F-80C.) Popular name: Shooting Star.

NORTH AMERICAN F-82

Powerplants: two Allison V-1710-143/145 (1,550 h.p. each). Span 51 feet, length 37 feet, height 16 feet. Top speed: over 475 m.p.h. Range: over 2,500 miles. Service ceiling: 40,000 feet. Gross weight: 20,750 pounds. Crew: two. Armament: various combinations of machine guns and rockets; F-82E can carry 25 five-inch rockets. (Data given for night-fighter version, F-82F.) Popular name: Twin Mustang.

REPUBLIC F-84E

Powerplant: one Allison J-35-17 (5,000 pounds thrust). Span 36 feet, length 38 feet, height 12 ft. 6 in. Top speed: over 600 m.p.h. Radius: 850 miles (over 1,000 miles with external tanks). Service ceiling: over 45,000 feet. Gross weight: over 18,000 pounds. Crew: one. Armament: six 50-caliber machine guns. Bombload: 32 five-inch rockets; various combinations of rockets and bombs possible. Popular name: Thunderjet.

REPUBLIC F-84F

Powerplant: one Allison J-35-A-25 (5,200 pounds thrust). Span 34 feet, length 43 feet, height 14 feet. Top speed: over 650 m.p.h. Manufacturer says performance, armament, other characteristics exceed those of F-84E. Gross weight, 25,000 pounds. Crew: one. Sweptwing version of F-84E. Popular name: Thunderjet.

NORTH AMERICAN F-86A

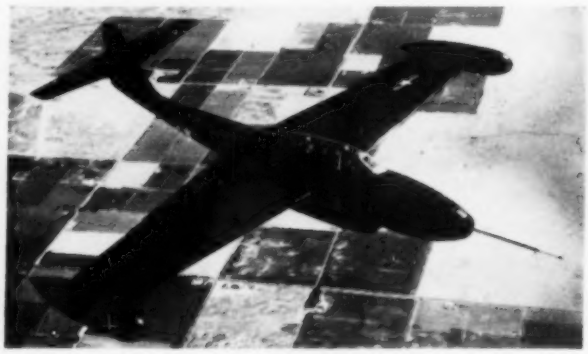
Powerplant: one General Electric J-47 (5,200 pounds thrust). Span 37 feet, length 37 feet, height 14 feet. Top speed: over 650 m.p.h. (holds official world's speed record of 670.981 m.p.h.). Combat radius: 500 miles. Service ceiling: over 40,000 feet. Gross weight: 13,715 pounds. Crew: one. Armament: six 50-caliber machine guns. Popular name: Sabre.

NORTH AMERICAN F-86D

Powerplant: one General Electric J-47 with afterburner. Span 37 feet, length 41 feet, height 14 feet. Top speed: over 650 m.p.h. Service ceiling: over 45,000 feet. Crew: one. All-weather version of F-86, designed to climb quickly to extreme altitudes for interception missions. Popular name: Sabre.

McDONNELL XF-88

Powerplants: two Westinghouse J-34 (3,000-pound thrust). Span 39 ft. 8 in., length 55 feet, height 15 feet. Top speed: over 700 m.p.h. Range: approx. 1,700 miles. Service ceiling: estimated 40,000 feet. Gross weight: over 15,000 pounds. Crew: one. Popular name: Voodoo.

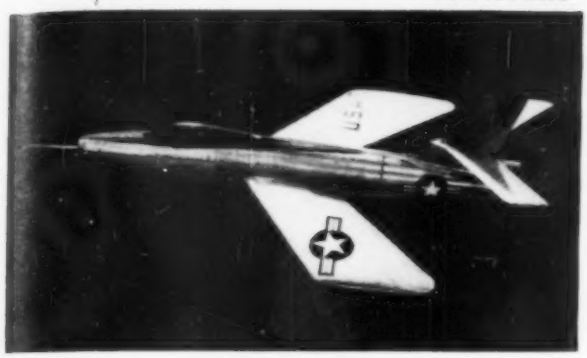


NORTHROP F-89

Powerplants: two Allison J-35 turbojets (4,000 pounds thrust each). Span 56 ft. 2 in., length 53 ft. 5 in., height 17 ft. 8 in. Top speed: over 600 m.p.h. Service ceiling: over 40,000 feet. Gross weight: over 40,000 pounds. Crew: two. Armament: six 20-mm. cannon. All-weather interceptor. Popular name: Scorpion.

LOCKHEED XF-90

Powerplants: two Westinghouse J-34 (approx. 3,000 pounds thrust each); later models have Westinghouse J-46 engines (approx. 6,000 pounds thrust each). Span 40 feet, length 55 feet, height 15 feet. No official data on speed, armament, service ceiling or range. Crew: one. Gross weight: approx. 30,000 pounds. Adjustable swept tail. Popular name: none.



REPUBLIC XF-91

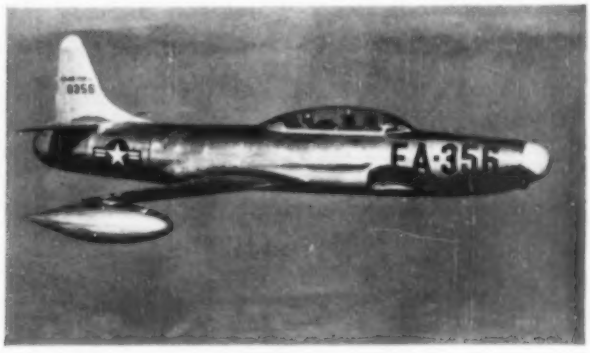
Powerplant: one General Electric J-47 turbojet (5,200 pounds thrust) with afterburner, plus four rocket assist motors in tail. Span 30 feet, length 49 feet, height 18 feet. Gross weight: approx. 30,000 pounds. No official data on speed, range, ceiling, armament or bombload. Inverse taper, swept, variable incidence wings. Popular name: none.

CONVAIR XF-92A

Powerplant: one Allison J-33-A-29. Span 31 feet, length 44 feet, height 15 feet. Service ceiling: over 40,000 feet. Gross weight: 15,000 pounds. Crew: one. No official data on speed, range. Delta-wing interceptor research craft. Popular name: none.

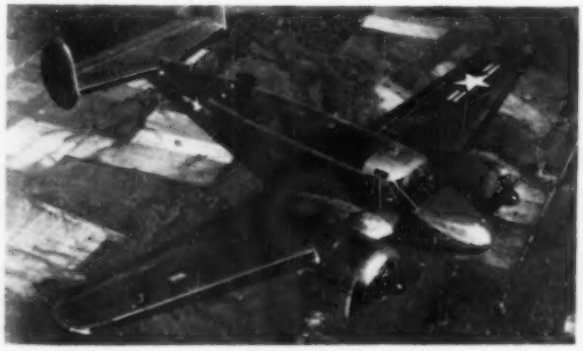
NORTH AMERICAN YF-93A

Powerplant: one Pratt and Whitney J-48 (6,250 pounds thrust). Span 39 feet, length 44 feet, height 16 feet. Top speed: estimated over 650 m.p.h. Gross weight: approx. 20,000 pounds. Crew: one. No official data on range, service ceiling, armament. Popular name: none.



LOCKHEED F-94

Powerplant: one Allison J-33-A-33 (5,200 pounds thrust), plus afterburner. Span 38 ft. 10½ in., length 40 ft. 1½ in., height 12 ft. 8 in. Top speed: 607 m.p.h. Service ceiling: 48,500 feet. Gross weight: 15,330 pounds. Crew: two. All-weather interceptor. (Data given for F-94A. F-94C is powered by Pratt and Whitney J-48 engine.) Popular name: none.

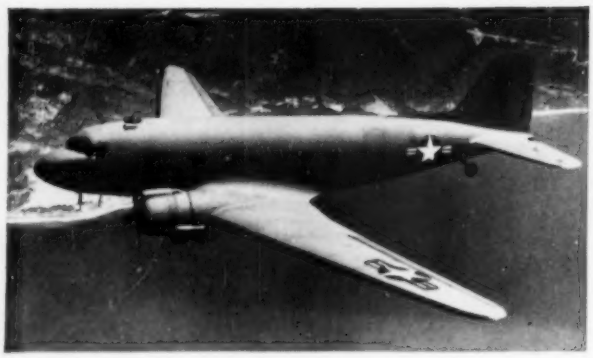


BEECH C-45

Powerplants: two Pratt and Whitney R-985 (450 h.p. each). Span 47 ft. 8 in., length 34 ft. 3 in., height 9 ft. 9 in. Top speed: 225 m.p.h. Range: 1,200 miles. Service ceiling: 26,000 feet. Gross weight: 8,600 pounds. Crew: two. Passengers: five. Popular name: Expediter.

CURTISS C-46

Powerplants: two Pratt and Whitney R-2800-51 (2,000 h.p. each). Span 108 ft. 1 in., length 76 ft. 4 in., height 21 ft. 9 in. Top speed: 265 m.p.h. Service ceiling: 24,500 feet. Gross weight: 45,000 pounds. Crew: four. Popular name: Commando.



DOUGLAS C-47

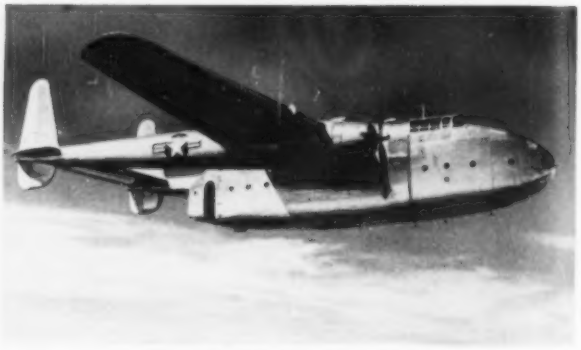
Powerplants: two Pratt and Whitney R-1830-92 (1,050 h.p. each). Span 95 feet, length 64 ft. 5½ in., height 16 ft. 11 in. Top speed: 229 m.p.h. Range: 1,500 miles. Service ceiling: 23,200 feet. Gross weight: 29,000 pounds. Crew: three. Cargo capacity: 6,000 pounds. Popular name: Skytrain.

DOUGLAS C-54

Powerplants: four Pratt and Whitney R-2000-9 (1,450 h.p. each). Span 117 ft. 6 in., length 93 ft. 3 in., height 27 ft. 6 in. Top speed: 308 m.p.h. Range: 1,900 miles. Service ceiling: 34,500 feet. Gross weight: 82,500. Crew: five. Cargo capacity: 29,000 pounds or 49 troops or 36 litters plus four attendants. (Data given for C-54G.) Popular name: Skymaster.

DOUGLAS C-74

Powerplants: four Pratt and Whitney R-4360-49 (3,250 h.p. each). Span 173 ft. 3 in., length 124 ft. 1 in., height 43 ft. 9 in. Top speed: 303 m.p.h. Range: 7,000 miles. Service ceiling: 18,000 feet. Gross weight: 165,000 pounds. Cargo capacity: 49,107 pounds or 125 troops or 115 litters. Crew: nine (including four relief crew members). Popular name: Globemaster.



FAIRCHILD C-82

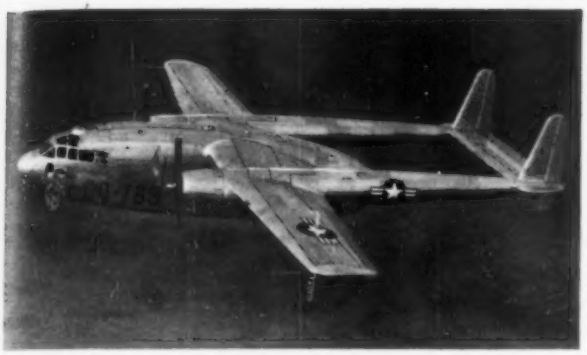
Powerplants: two Pratt and Whitney R-2800-85 (2,100 h.p. each). Span 106 ft. 6 in., length 77 ft. 1 in., height 25 ft. 5 in. Top speed: 238 m.p.h. Combat radius: 1,000 miles. Service ceiling: 22,000 feet. Gross weight: 50,000 pounds. Cargo capacity: 18,000 pounds or 42 paratroopers and equipment or 36 litters. Crew: four. Popular name: Packet.

BOEING C-97A

Powerplants: four Pratt and Whitney R-4360-35 (3,500 h.p. each). Span 141 ft. 3 in., length 101 ft. 4 in., height 38 ft. 3 in. Top speed: 375 m.p.h. Range: 5,000 miles. Service ceiling: 40,000 feet. Gross weight: 148,000 pounds. Cargo capacity: 53,000 pounds or 130 troops or 79 litters with medical attendants. Crew: five. (A version is transport, B version is passenger.) Popular name: Stratofreighter.

CONVAIR XC-99

Powerplants: six Pratt and Whitney R-4360-41 (3,500 h.p. each). Span 230 feet, length 182 ft. 6 in., height 57 ft. 10 in. Top speed: over 300 m.p.h. Range: 8,100 miles. Service ceiling: 30,000 feet. Gross weight: over 300,000 pounds. Cargo capacity: 100,000 pounds or 400 troops or 305 litters plus two attendants. Crew: five. (Transport version of B-36.) Popular name: none.



FAIRCHILD C-119

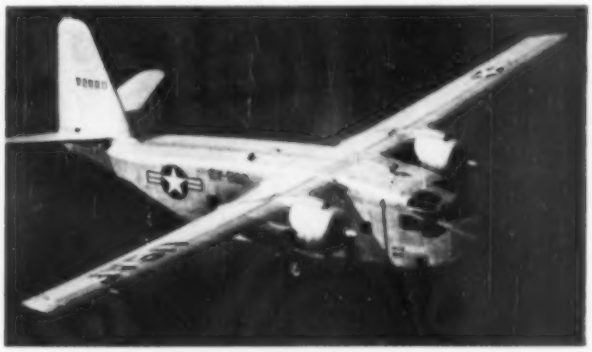
Powerplants: two Pratt and Whitney R-4360-20W (3,500 h.p. each). Span 109 ft. 3 in., length 85 ft. 10 in., height 26 ft. 8 in. Top speed: 258 m.p.h. Combat radius: 1,152 miles. Service ceiling: 23,500 feet. Gross weight: 64,000 pounds. Cargo capacity: over 30,000 pounds or 64 paratroopers or 35 litters and attendants. Crew: five. Popular name: Packet.

FAIRCHILD XC-120

Powerplants: two Pratt and Whitney R-4360 (3,250 h.p. each). Span 109 ft. 3 in., length 83 feet, height 24 ft. 9 in. Top speed: over 250 m.p.h. Combat radius: 1,152 miles. Service ceiling: 23,500 feet. Gross weight: 64,000 pounds. Cargo capacity: 20,000 pounds or 64 troops or 36 litters. Crew: five. Adaptation of C-119B utilizing detachable cargo pod. Popular name: Pack Plane.

LOCKHEED C-121

Powerplants: four Wright R-3350 (2,500 h.p. each). Span 123 feet, length 95 ft. 2 in., height 22 ft. 5 in. Top speed: 343 m.p.h. Range: 5,100 miles. Service ceiling: 27,800 feet. Gross weight: 107,000 pounds. Cargo capacity: 47,891 pounds. Crew: five with four relief. Popular name: Constellation.



CHASE YC-122C

Powerplants: two Wright R-1820-101 (1,425 h.p. each). Span 95 ft. 8 in., length 61 ft. 8 in., height 24 ft. 8 in. Top speed: 240 m.p.h. Range: 2,900 miles (4,540 with extra tanks). Service ceiling: 29,100 feet. Gross weight: 32,000 pounds. Cargo capacity: normal useful load 13,000 pounds or 30 troops with equipment. Crew: two. (Modified CG-18 with engines.) Popular name: Avitruc.

CHASE XC-123

Powerplants: two Pratt and Whitney R-2800-CB-15 (2,400 h.p. each). Span 110 feet, length 77 ft. 1 in., height 32 ft. 8 in. Top speed: 245 m.p.h. Range: 2,110 miles (3,110 with extra tanks). Service ceiling: 29,000 feet. Gross weight: 54,000 pounds. Cargo capacity: normal useful load 27,200 pounds or 60 troops with equipment or 50 litters, six ambulatory patients and six medics. Crew: two. Popular name: Avitruc.

DOUGLAS C-124A

Powerplants: four Pratt and Whitney R-4360-20W (3,500 h.p. each). Span 173 ft. 3 in., length 127 ft. 1 in., height 48 ft. 3.6 in. Top speed: over 300 m.p.h. Range: 5,240 nautical miles. Service ceiling: over 20,000 feet. Gross weight: 175,000 pounds (alternate gross, 194,500 pounds). Cargo capacity: 76,000 pounds; can carry 200 troops and equipment. Crew: five. Popular name: Globemaster II.

NORTHROP YC-125

Powerplants: three Wright R-1820-99 (1,425 h.p. each). Span 87 feet, length 67 ft. 1 in., height 27 feet. Top speed: 207 m.p.h. Range: 1,856 miles. Service ceiling: over 25,000 feet. Gross weight: 40,900 pounds. Cargo capacity: 20,000 pounds. Crew: two for assault transport version, four for Arctic rescue version. Popular name: Raider.

CESSNA LC-126

Powerplant: one Jacobs (300 h.p.). Span 36 ft. 2 in., length 27 ft. 4 in., height 7 ft. 2 in. Top speed: over 165 m.p.h. Range: over 750 miles. Service ceiling: 18,300 feet. Gross weight: 3,350 pounds. Crew: one. Can carry four passengers. Used by Air Force and Air National Guard for search and rescue missions in north. Popular name: none.

CONVAIR L-5

Powerplant: one Lycoming O-485 (185 h.p.). Span 34 feet, length 24 ft. 1 in., height 7 ft. 11 in. Top speed: over 130 m.p.h. Combat radius: over 160 miles. Service ceiling: 15,000 feet. Gross weight: over 2,300 pounds. Crew: one. Used for liaison and rescue operations. Can be used with floats as light cargo or photographic plane. Popular name: Sentinel.

CONVAIR L-13

Powerplant: one Franklin O-425-9 (245 h.p.). Span 40 ft. 5.5 in., length 31 ft. 9 in., height 8 ft. 5 in. Top speed: 115 m.p.h. Range: 368 miles. Service ceiling: 15,000 feet. Gross weight: 2,950 pounds. Used as liaison and ambulance plane. Can be fitted with floats or skis. Crew: two. Popular name: none.

RYAN L-17B

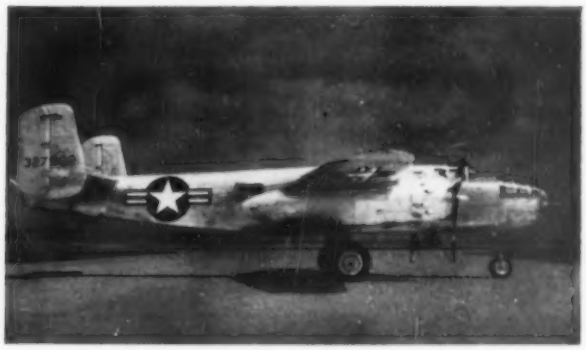
Powerplant: one Continental E-185-3 (205 h.p.). Span 33 ft. 4.5 in., length 27 ft. 3 in., height 8 ft. 7.5 in. Top speed: 157 m.p.h. Range: 500 miles. Service ceiling: 15,600 feet. Gross weight: 2,750 pounds. Crew: one. Can carry three passengers. Used by Army Field Forces and Air National Guard for observation and liaison. Popular name: Navion.

CESSNA L-19A

Powerplant: one Continental E-407-11 (213 h.p.). Span 36 feet, length 25 feet, height 7 ft. 6 in. Top speed: 130 m.p.h. Range: 800 miles. Service ceiling: 23,100 feet. Gross weight: 2,100 pounds. Crew: two. Used by Army Field Forces as reconnaissance and liaison plane. L-19 was on duty in Far East less than six months after contract was let to Cessna. Popular name: none.

NORTH AMERICAN T-6

Powerplant: one Pratt and Whitney R-1340-AN-1 (600 h.p.). Span 42 feet, length 29 ft. 6 in., height 10.8 feet. Top speed: 212 m.p.h. Range: 870 miles. Service ceiling: 24,750 feet. Gross weight: 5,617 pounds. Crew: two. (Data given for T-6G, modernized version of older T-6 trainers.) Popular name: Texan.



NORTH AMERICAN TB-25

Powerplants: two Wright R-2600 (1,700 h.p.). Span 67 ft. 6 in., length 53 ft. 6 in., height 16 ft. 5 in. Top speed: 275 m.p.h. Range: 1,500 miles. Service ceiling: 28,000 feet. Gross weight: approx. 26,000 pounds. Crew: six. No B-25 operational units; used for twin-engined flight training and for administrative and proficiency flying. Popular name: Mitchell.

NORTH AMERICAN T-28

Powerplant: one Wright R-1300-1 (800 h.p.). Span 40.1 feet, length 32 feet, height 12.66 feet. Top speed: 288 m.p.h. Range: 1,008 miles. Service ceiling: 29,800 feet. Gross weight: 6,365 pounds. Crew: two. First U. S. trainer to have tricycle landing gear, steerable nose wheel. Popular name: none.

CONVAIR T-29

Powerplants: two Pratt and Whitney R-2800 (2,400 h.p.). Span 91 ft. 9 in., length 74 ft. 8 in., height 26 ft. 11 in. Top speed: 316 m.p.h. Gross weight: 40,011 pounds. Crew: three. Adaptation of commercial Convair-Liner used as navigational trainer. Has 14 training stations for navigational students. Popular name: none.

FAIRCHILD YT-31

Powerplant: one Lycoming R-680-13 (295 h.p.). Span: 41 ft. 4 in., length 27 ft. 11 in., height 9 ft. 10 in. Top speed: 166 m.p.h. Range: 900 miles. Service ceiling: 19,500 feet. Gross weight: 3,750 pounds. Crew: two. Popular name: none.

LOCKHEED T-33A

Powerplant: one Allison J-33-A-23 (over 5,200 pounds thrust). Span 38 ft. 10½ in., length 37 ft. 8½ in., height 11 ft. 8½ in. Top speed: 580 m.p.h. Range: 1,345 miles. Service ceiling: over 45,000 feet. Gross weight: 14,442 pounds. Crew: two. Training version of F-80. Popular name: Shooting Star.

BEECH YT-34

Powerplant: one Continental E-225-8 (225 h.p.). Span 32 ft. 10 in., length 25 ft. 10 in., height 9 ft. 7 in. Top speed: 188 m.p.h. Range: 770 miles. Service ceiling: 21,200 feet. Gross weight: 2,750 pounds. Crew: two. Air Force trainer development of Bonanza personal plane. Popular name: Mentor.

TEMCO YT-35

Powerplant: one Franklin 6AF-165-B3 (165 h.p.). Span 29 ft. 2 in., length 21 ft. 8 in., height 6 ft. 4 in. Top speed: 150 m.p.h. Range: 550 miles. Service ceiling: 17,000 feet. Gross weight: 1,975. Crew: two. Popular name: Buckaroo.

SIKORSKY H-5

Powerplant: one Pratt and Whitney R-985-B4 (450 h.p.). Span (main rotor diameter) 49 feet, length 41 ft. 2 in., height 12 ft. 11 in. Top speed: 103 m.p.h. Range: 276 miles. Gross weight: 5,500 pounds. Hovering ceiling: 5,000 feet. Absolute ceiling: 14,500 feet. Seats, including crew: four. Can accommodate two litters and one attendant plus rescue hoists. Popular name: none.

BELL H-12

Powerplant: one Pratt and Whitney R-1340-55 (600 h.p.). Span (rotor diameter) 47 ft. 6 in., length 39.55 feet, height 11.3 feet. Top speed: 120 m.p.h. Hovering ceiling: 3,350 feet. Absolute ceiling: 11,000 feet. Gross weight: 6,513 pounds. Range: 300 miles. Seats: 8-10. Popular name: none.

BELL H-13D

Powerplant: one Franklin 0-335-3 (200 h.p.). Rotor diameter 35 ft. 1½ in., length 41 ft. 4½ in., height 8 ft. 2½ in. Top speed: 98 m.p.h. Range: 161 miles. Hovering ceiling: 5,400 feet. Absolute ceiling: 13,000 feet. Gross weight: 2,202 pounds. Seats: three. Popular name: none.

BELL XH-15

Powerplant: one Continental 0-470-5 (250 h.p.). Rotor diameter 36 ft. 10 in., length 43 ft. 9 in. Top speed: over 100 m.p.h. Combat radius: 200 miles. Absolute ceiling: 20,000 feet. Gross weight: 2,700 pounds. Seats: two. Popular name: none.

PIASECKI XH-16

Powerplants: two Wright R-1820-76. New long-range helicopter designed for greater loads and range than present service helicopters. Twin tandem rotors, all-metal fuselage, approximately size and shape of C-54. Detachable cargo compartment. Crew: three. Can carry 25 troops. Other data classified. Popular name: none.

KELLETT-HUGHES XH-17

Powerplants: two General Electric J-35 gas turbines (4,000 pounds thrust each). Experimental heavy-lift jet helicopter, originally designed to Army-Air Force specifications by Kellett. Final development by Hughes. Short range. Has not yet flown. Crew: two. Other data classified. Popular name: none.

SIKORSKY H-18

Powerplant: one Franklin 6V6-245-B16F (245 h.p.). Rotor diameter 33 feet, length 27 ft. 5 in., height 8 ft. 8 in. Top speed: 111 m.p.h. Hovering ceiling: 2,600 feet. Absolute ceiling: 13,000 feet. Range: 306 miles. Gross weight: 2,700 pounds. Seats: four. Popular name: none.

SIKORSKY H-19

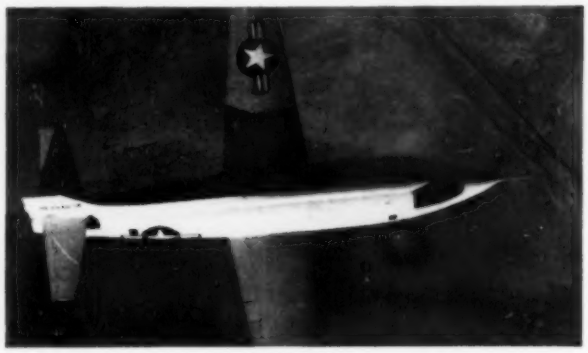
Powerplant: one Pratt and Whitney R-1340-57 (600 h.p.). Rotor diameter 53 feet, length 41 ft. 9 in., height 13 ft. 11½ in. Top speed: 110 m.p.h. Range: 400 miles. Hovering ceiling: 9,000 feet. Absolute ceiling: 16,500 feet. Gross weight: 7,500 pounds. Seats: 12. Popular name: none.

PIASECKI H-21

Powerplant: one Wright R-1820-76A (1,425 h.p.). Rotor diameter 44 feet, length 54 feet, height 15 feet. Top speed: 130 m.p.h. Range: 610 miles. Service ceiling: 16,000 feet. Gross weight: 10,113 pounds. Seats: 16-22. Specially-designed "omniphibious" tricycle landing gear which incorporates wheels, floats and skis. Popular name: none.

SEIBEL YH-24

Powerplant: one Lycoming O-290-D (130 h.p.). Rotor diameter 29 feet, length 27 feet, height 10 feet. Top speed: 65 m.p.h. Range: 170 miles. Hovering ceiling: 3,500. Absolute ceiling: 7,500 feet. Gross weight: 1,500 pounds. Seats: two. Popular name: none.



BELL X-1

Powerplant: one Reaction Motors Model 6000C rocket engine (6,000 pounds thrust). Span 28 feet, length 31 feet, height 10 ft. 10 in. Designed for 1,600 m.p.h. speed at 60,000 feet. X-1A designed for 1,700 m.p.h. speed at 80,000 feet. Flight duration: 2.5 minutes at full power. X-1A flight duration: 4.2 minutes at full power. Carried aloft by B-29. Has flown faster than sound on numerous occasions.

No Photograph Available.

BELL X-2

Powerplant: one Reaction Motors rocket engine. Research and development "laboratory" to explore problems of transonic and supersonic flight. Stainless steel body. Sweptback wing. From drag and power standpoint, X-2 designed for higher speeds than X-1.

No Photograph Available.

DOUGLAS X-3

Supersonic study directed toward development of a design capable of speeds three times that of sound with altitude ceiling of 200,000 to 300,000 feet. Over 60 combinations of powerplants and configurations examined. Prototype under construction as part of joint Air Force, Navy, NACA, Industry research program. All other data classified.

NORTHROP X-4

Powerplants: two Westinghouse J-30 gas turbine engines. Span 25 feet, length 20 feet, height 15 feet. Gross weight: approx. 7,000 pounds. Top speed: classified, but in subsonic range. Crew: one. Designed for stability and control investigations on this type aircraft for flight at high subsonic speeds. Sweptback wing; semi-tailless; elevons; tricycle gear; ejection seat.

GRUMMAN SA-16A

Powerplants: two Wright R-1820-76A (1,425 h.p.). Span 80 feet, length 61 ft. 4 in., height 24 ft. 4 in. Top speed: 270 m.p.h. Range: 2,706 miles. Service ceiling: 26,000 feet. Gross weight: 27,025 pounds. Crew: 4-6. Carries 14 passengers or 16 litters. To be used as personnel and cargo transport, search and rescue amphibian, multi-engined seaplane trainer. Popular name: Albatross.

BOEING SB-17

Powerplants: four Pratt and Whitney R-1820 (1,200 h.p.). Span 103 ft. 9 in., length 74 ft. 9 in., height 19 ft. 1 in. Top speed: 275 m.p.h. Combat radius: 560 miles. Gross weight: 44,560 pounds. Crew: 10. SB-17 is search and rescue version of standard B-17. Equipped with motor-driven lifeboat containing medical equipment and supplies, slung under fuselage and dropped to survivors. Popular name: Flying Fortress.

INSPECTOR GENERAL

The Air Force's answer man is combination inspector and business efficiency expert.

Air policemen guard security, protect U.S. bases.

Checking Up On the Air Force

Well Done
TO
AVIATION CADET
Charles E.
BRYANT
CLASS 51-A VANCE AFB
1 BRYANT WAS ON A NIGHT X-C... 15 MILES NORTH OF ST. JOSEPH, MO. THE ENGINE BEGAN RUNNING ROUGH. OIL PRESSURE BELOW 50 PSI, OIL AND CYLINDER TEMP IN THE RED....
2 CORRECTIVE MEASURES WERE APPLIED AT ONCE—MIXTURE TO AUTO RICH, RPM INCREASED, POWER REDUCED, CARBURETOR CHECKED FOR ICING... BUT THE ENGINE QUIT COLD AT 7500 FT.... AN AIR START WAS TRIED UNSUCCESSFULLY... HE HEADED TOWARD ST. JOSEPH AIRPORT.
...THE TOWER WAS ALERTED AND THE HIGH INTENSITY LIGHTS TURNED ON...
3 HE PLANNED THAT IF HE DID NOT HAVE A RUNWAY WITHIN GLIDING RANGE BY THE TIME HE REACHED 4000 FEET HE WOULD BAIL OUT. AT 4000 FT. HE HAD THE RUNWAY LINED UP FOR A STRAIGHT-IN APPROACH... HE SET UP HIS GLIDE OF 85 TO 95 KNOTS WITH THE GEAR AND FLAPS UP TO GIVE TOP PERFORMANCE GLIDE...
4 WAITING UNTIL HE HAD IT MADE AND WAS READY TO ROUND OUT, HE LOWERED THE GEAR, CUT ALL SWITCHES, INCLUDING FUEL AND LANDED WITHIN THE FIRST THIRD OF THE RUNWAY!
THIS IS AN OUTSTANDING EXAMPLE OF PLANNING BY A YOUNG PILOT. AFTER ENGINE FAILURE... HE HAD FLOWN THE T-28 TEN HOURS PRIOR TO THIS FLIGHT... HIS CALM JUDGMENT SAVED A VALUABLE AIRPLANE TO FLY AGAIN!

Flight safety is promoted by the Inspector General. Cartoons (above) help teach basic flight principles.

THE INSPECTOR GENERAL is the official investigator of the Air Force. The Inspector General is Lieut. Gen. Howard A. Craig and he is concerned with vital problems as varied as security, aircraft safety, and even the efficiency with which the Air Force conducts its business.

Backing General Craig is an organization divided into six major units: Deputy Inspector General, Director of Flight Safety Research, Director of Technical Inspection, Director of Procurement Inspection, Director of Special Investigations and the Air Provost Marshal.

This network of investigating bodies combines to make the Command Investigation System of the Air Force whose primary purpose is to keep the Chief of Staff up-to-date on the current status of his huge organization.

The responsibilities of the Inspector General have increased 100-fold since October, 1777, when the Office of the Inspector General was created as part of the Continental Army under Gen. George Washington. As wars have grown larger and more complex, so have the duties of the Inspector General.

Inspectors do not devote their time solely to reports on improper entries in organization sick books or to uninitiated entries in the morning report. Instead, they determine whether an organization—major command, wing, group or squadron—can maintain the state of operational readiness expected of the Air Force. The inspector not only determines that directives and instructions are adequate but that the procedure used to comply with the directives and instructions is the most efficient and economical.

At all times the Inspector General must be able to answer questions concerning every aspect of morale, procurement, logistics, tactics and defense. He must advise the Chief of Staff when Air Force activities are not in phase, lagging behind, or advancing beyond, the capabilities of the component parts of the Air Force. He must count the pulse, diagnose the ailment, and prescribe the remedy. In spite of the magnitude of his problem and the wide scope of his interest, he must continually try to expand it.

There is nothing remote about inspection. It can include such minor, yet important, essentials as making sure that each typewriter has a cover; or it can determine that hundreds of thousands of dollars designated for developing new aircraft are being spent in the best possible way for this purpose.

Matters relating to industrial procurement are checked by the Directorate of Procurement (*Continued on page* 166)

First U.S. plane destroyed in the Korean War was this MATS C-54 caught by strafing fighters.

Airline To Everywhere...

MILITARY AIR TRANSPORT SERVICE

ONE DAY last June, Number 5518, a Douglas *Skymaster* veteran of the Pacific airways, stood at the end of a Korean runway, its silver fuselage gleaming in the sun.

Crew members reclined in the shade of its broad wings awaiting the arrival of the Kimpo airfield jeep with some minor repair parts. The pilot was sipping coffee in the operations ready room. The co-pilot was taking a final look at the weather chart.

Suddenly out of the sky came four North Korean fighter planes in a long dive. As they flashed over the runway they opened up with cannon and machine guns. Their target was the unarmed transport. As the fighters disappeared in the direction of Manchuria the giant cargo transport was burning and damaged beyond repair.

Number 5518, one of the hundreds of Military Air Transport Service's (MATS) cargo transports assigned to air routes throughout the world, became the first American airplane casualty in the Korean conflict. Thus was the mission of MATS changed from one of peace to one of war.

In a few hours cables came streaming from Tokyo to the Pentagon requesting accelerated airlift, additional communications facilities, mobile weather units and air rescue planes and personnel.

Within hours the crews of 40 four-engined MATS transports scattered half way across the world received their orders and were flying to Fairfield-Suisan Air Force Base in California to join the Pacific airlift.

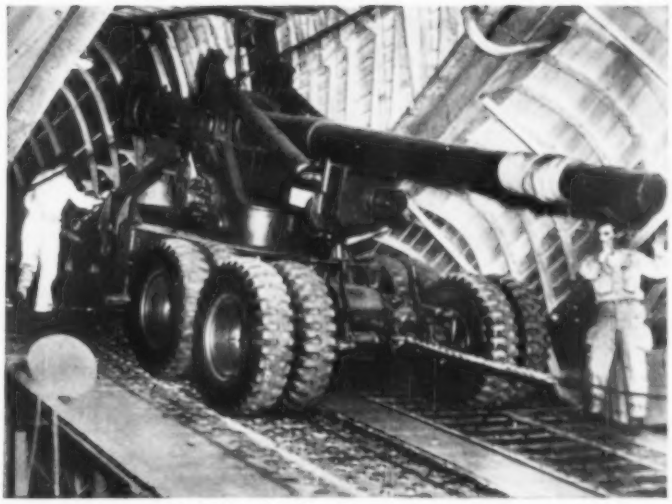
Working with the Air Materiel Command, military

Do you want to haul a tank, a sparkplug, a wounded man? MATS flies everything over 75,000 miles of air routes.

transport experts sent a hurry-up call to the civilian commercial airlines and 66 commercial transports from 17 airlines were soon chartered and flying across the Pacific.

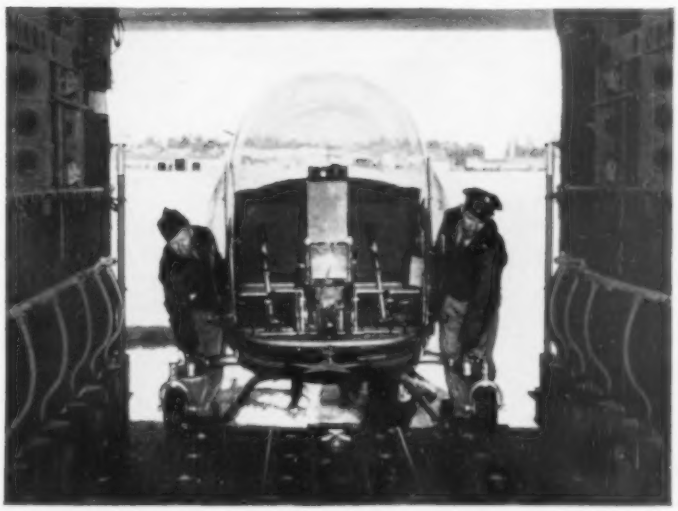
Mobile air weather units and air communications units were airborne and on their way to join the conflict. In Japan, the Third Air Rescue Squadron moved into Korea with helicopters and stood by to guard the airplanes.

At Fairfield-Suisan, a West Coast Airlift Task Force was quickly formed to exercise on-the-spot control of traffic and to integrate civil contract carriers and United Nations planes into the Pacific airlift under the MATS system. Two USAF Troop Carrier Groups joined the airlift;



Huge 155-mm. gun fits into hold of Douglas C-124—the largest MATS transport. Plane can carry any combat equipment except heavy tanks.

ROK soldiers board MATS C-54 at Pyongyang Airfield in most concentrated air evacuation of the Korean War during setbacks last December.



Bell helicopter is loaded into Fairchild C-82. Advanced version of C-82, called C-119, is slated for big production and will see heavy use.

The six-by-six truck unloading C-54 at Korea's Kimpo Airfield was itself unloaded from a C-119 only a few minutes before this photo was taken.

Flight Service is technical support branch of MATS, operates only within U.S., and provides flight advisory and monitoring services. It is also used by other branches of the armed forces.

the Canadians sent an RCAF squadron and the Belgian government Sabina DC-4's.

Three months after Number 5518 had been destroyed at Kimpo, MATS planes were delivering 106 tons of crucial cargo and personnel per day to Japan, compared with 70 tons a month prior to that Tuesday morning.

The Korean conflict brought into sharp focus a new MATS responsibility—the air evacuation of military sick and wounded on a global scale. This responsibility was given to MATS August 1, 1949, by the Secretary of Defense on recommendation of the Joint Chiefs of Staff and foreshadowed the air evacuation of wounded American troops as quicker, more efficient and cheaper than the surface transportation method.

During the six months dating from the start of the Korean action on June 24 to Christmas, more than 14,000 sick and wounded were airlifted from the Pacific to hospitals throughout the United States.

Highlighting this operation are the long-range C-97's and C-74's which take off from Tokyo, make one refueling stop in Hawaii, and land at San Antonio, Tex., nearly one-third of the distance around the world, after 26 hours of flying time.

With the air evacuation responsibility, strategic air transport under MATS is now a two-way street—critical cargos carried outbound and military sick and wounded transported inbound.

The Korean conflict is the second international crisis in which MATS has been called upon to give strategic services since it was formed two and one-half years ago under the command of Maj. Gen. Laurence S. Kuter. The first was the Berlin Airlift, or Operation Vittles.

In Operation Vittles, MATS solved the problem of operating large numbers of transports in limited air space over short routes. Operation Pacific was a problem in providing logistic air support over great distances.

The shortest air supply route in Vittles was a 274-mile round trip; the longest 563 miles. The shortest round trip route in the Pacific airlift, from Tacoma, Wash., through Alaska and the Aleutians to Japan, is 11,376 miles, its longest round-trip route, from California through the mid-Pacific to Japan, is 16,166 miles.

Tonnages deposited in Berlin averaged more than 5,000 tons daily as soon as the lift had assumed a daily pace. Tonnage deposited in Japan has, under the same criteria, averaged about 110 tons daily. Numbers of aircraft involved are about equal, 225 in Vittles and about 250 on the Pacific Airlift.

However, the airplane miles involved in placing more than 100 tons daily in Tokyo exceed the airplane miles involved in depositing 5,000 tons daily in Berlin by some 10,000 miles daily. The comparison, however, illustrates the point that MATS, as the military air transport agency for the Department of Defense, is prepared to deliver scheduled and strategic airlift to any part of the world where U. S. forces operate.

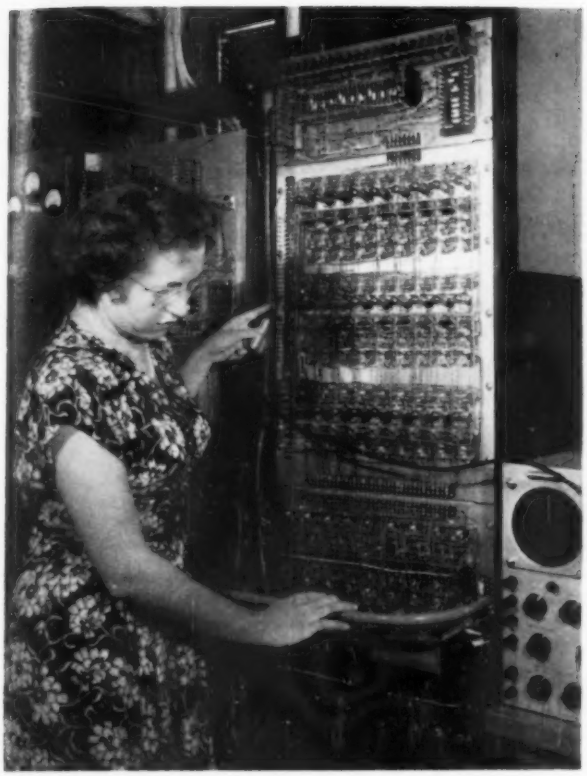
MATS is not an airline. It is actually an air service command—a major global command of the USAF, created as a basic framework upon which our ability to conduct war on a global scale is based.

The present pattern of MATS routes stretches 75,000 miles from establishments in the United States to every corner of the globe where American forces are stationed and where American interests lie.

MATS not only operates this (*Continued on page* 154)

Air evacuation has been successful in Korean War. In first six months more than 14,000 were airlifted back to U.S. Above, Ens. Joan Cordone gives Pvt. Tony McGinnis penicillin shot.

Tractor being unloaded from Fairchild C-119 at Kimpo Airfield dramatizes tremendous airlift operations. MATS planes deliver thousands of tons of equipment to Japan, thence to Korea.



Are you this smart? Most persons would take six years to solve the problems answered in one hour by this USAF computer. Air Force comptroller's division uses electronic "genius."

COMPTROLLER

AF Efficiency Experts

One USAF statistician with a comptometer may be able to put an extra bomber in the sky.

IN THE EARLY DAYS of flying a good pilot was one who "flew by the seat of his pants." He had little to guide him other than instinct and feel. But today's complex planes, with their maze of instruments and gauges, have made seat-of-the-pants flying as obsolescent as the *Jenny*.

The management of the Air Force has gone through a similar transition. It can no longer be run by feel, or by personal contact of a small group of officers who know each other intimately. The Air Force today is too large for these techniques. It is larger than any single, integrated private business. It operates over 200 military establishments all over the world—many of the bases complete with homes, theaters, schools and powerplants. It trains tens of thousands of men for hundreds of highly specialized jobs, and runs technical schools as large as some state universities. And it keeps more than half-a-million people at work, buys billions of dollars worth of planes and equipment.

Today the Air Force must be run "by the numbers."

These numbers are carefully selected dollar figures and key statistics that gauge the activities of the organization from top to bottom. They provide the basis for planning and controlling all the operations of the Air Force.

The job of the efficient management of the Air Force belongs to the comptroller. He is responsible for developing budget and fiscal programs. He provides statistical services for Air Staff. The function of the Comptroller points up the new concept that the military should develop the same kind of careful planning, cost-control, and programming as private business.

The Comptroller has been concerned recently with improving the Air Force's overall system of programming. "Programming" means the scheduling of men, materiel and activities for any mission at any future date. Good programming insures that the amounts specified are sufficient but not excessive, and that the program is feasible.

Another of the Comptroller's duties is to provide statistical services for the various commands and for the top staff. These statistics—cold, hard facts expressed as numbers—are no substitute for brain work or the human contacts that are the essence of real leadership. But they are gauges—like the pilot's instrument panel—that focus attention where it is needed. Statistics make it possible for the operator, who knows all the details of his problem, and the chief, who must avoid detail, to reach a clear and rapid understanding of a situation.

Reports engineers of Comptroller's offices are constantly busy giving assistance to Air Force officers. These men design the management reports necessary for efficient operation.

They must first see the Air Force through the eyes of its top commanders and their staffs. How does the Air Force look from their angle? What worries, both current and long-range, are they bringing to their desks each morning? What indicators will they understand and interpret most easily? The reports engineer must also understand the personal traits of the men who will use his reports. What particular arrangements of the figures will place the facts in their most telling perspective? And what is the best way to capture attention for the dull and unpleasant aspects of the story?

Next, all available information is sifted down to the minimum array of critical indicators required to keep the staff informed of the progress and effectiveness of operations. Then follows a mock-up of arrangement and presentation.

It is at this point that the difficulty of "selling" the report begins. The top staff officer will listen attentively as he is briefed on the new report by the "numbers man." A few complimentary words will be spoken, the conference is closed and a copy (*Continued on page* 149)

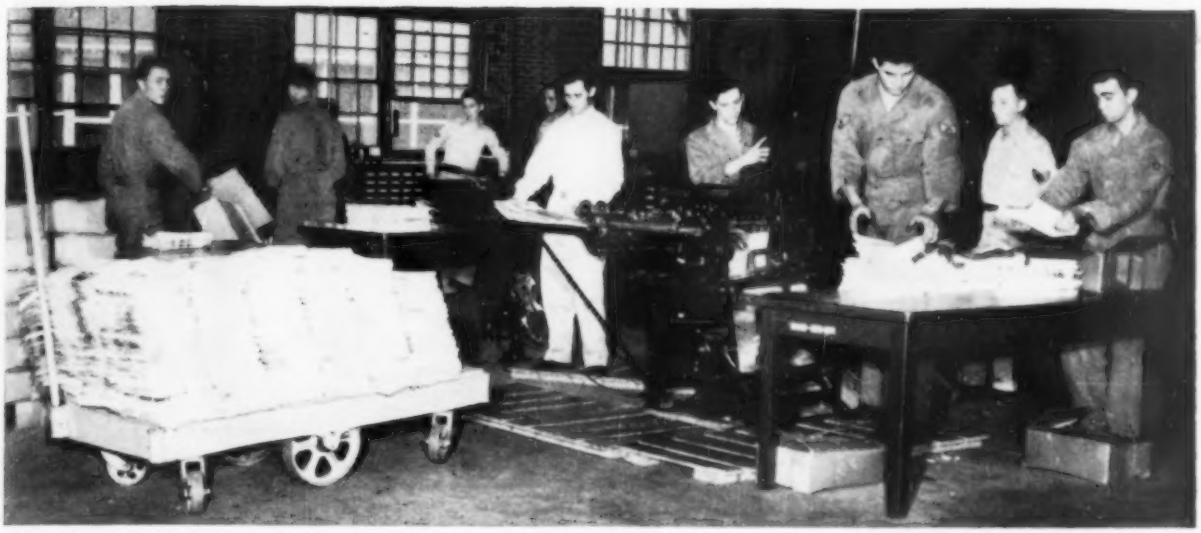
Finding the cure for air sickness is one of major studies in this laboratory.

Newest teaching methods, among them use of visual aids (above), are used at the Air Command and Staff School. Here, the Air Force's future top generals are trained.

AIR UNIVERSITY

HOW TO EDUCATE

Air War College students, including an RAF group captain (rear) discuss problems of strategic airpower.



Correspondence school is one of University's big activities. Reserve officers and airmen enroll in USAF Extension Course Institute to study by mail in many of same courses offered by resident USAF schools. Above, addressograph section of extension institute mails lessons.

A LEADER

Here's where the officers learn how to run the world's best Air Force.

HAVE YOU GOT a second-hand on your watch? Look at it for five seconds.

During those five seconds the United States Air Force was operating full blast just as it does 24 hours of every day.

In Korea, while you looked at your watch, Air Force jets were rocketing Communist troops.

While those five seconds ticked off, a B-29 was warming up at an English airstrip prior to a practice bombing mission.

In Connecticut, a civilian volunteer was manning an air defense spotter's post; near Chicago, an F-86 interceptor pilot was waiting in a ready room for an alert that could come any minute.

All over the world, hundreds of thousands of Air Force officers and airmen were doing hundreds of thousands of jobs. Each of the jobs fits into a big pattern based on the principles of air war.

One place these principles are taught is at the Air University.

Commanded by Gen. George C. Kenney, the Air University provides professional education to Air Force officers through:

- The Air War College.
- The Air Command and Staff School.
- The School of Aviation Medicine.
- The Institute of Technology.
- The Extension Course Institute.
- Other activities such as the University Library and the Human Resources Research Institute.

The typical student at the Air War College is a colonel or lieutenant colonel with 10 to 18 years service. This college—senior school of the Air University educational system—operates as the Air Force doctrinal center in the fields of strategy and use of air power.

Files at Air University Library cover all aviation fields.

The college curriculum of its fifth class, 1951-A, covers a five and a half months' term, and the student body is composed of 135 senior officers of the Air Force, Army, Navy and Marine Corps. A few members of the U. S. State Department are also in attendance.

The most extensive program of residence instruction in the Air University is offered by the Air Command and Staff School which offers two general service courses and seven specialized staff courses.

This school is open to all regular Air Force and Reserve Officers with more than one but less than five years active Federal commissioned service. The course lasts eight weeks and is offered six times each year. It emphasizes duties of commanders at the squadron level and of staff officers at the squadron and group levels.

One of the courses offered by the Air Command and Staff School is the Academic Instructor Course, open to all officers, airmen, and civilian employees who have or are preparing for instructional duties of any sort. It deals with the basic elements of good teaching, emphasizes the importance of effective written and oral communication, and provides individual work in practice teaching, curriculum construction and testing.

From the School of Aviation Medicine which has its headquarters at Randolph AFB, Tex., come all Flight Surgeons for the Air Force, and all Flight Nurses for the Air Force and the Navy, plus other medical and technical specialists.

A recent incident in air evacuation of Korean war wounded illustrates how specialized training at the School of Aviation Medicine saves lives. On October 25, a big C-54 winging its way Stateward along the southern evacuation route with Korean casualties (*Continued on page* 136)

USAF MEDICAL SERVICE

THE DOCs WHO KEEP 'EM HEALTHY

Air evacuation, research, food inspection, medical care are all duties of the AF medical service.

Milk inspection is typical job of health service. Col. Wayne O. Kester, left, is chief of veterinary service responsible for testing animal food products.

THE UNITED STATES Air Force is scattered over the entire world—in jungles, in the Arctic, on deserts, sometimes 1,000 miles from nowhere. Men and women of the USAF aren't surrounded by complete modern utilities and services found in the nation's cities. For this reason the Medical Service's task isn't limited to the kind of medical care required by an average civilian organization as large as the Air Force.

The changing requirements of the Air Force demand that the Medical Service be flexible, able to meet new medical requirements almost overnight. In order to treat injuries and keep men healthy the doctors must be on the spot—wherever that spot may be.

There are medical units assigned or available to every Air Force installation and major hospitals are distributed throughout all commands to meet Air Force needs. Since hospitals can't be moved like smaller units, they are located more or less permanently on Air Force bases. Ultimately, however, full hospital facilities will be air transportable—enabling a fully-equipped hospital to be moved anywhere on earth on a few hours' notice.

The Office of the Surgeon General, USAF, coordinates the activities of the Air Force Medical Service. This office is divided into five major staff sections headed by (1) the Director of Professional Services, (2) the Director of Staffing and Education, (3) the Director of Plans and Hospitalization, (4) the Chief of Dental Service and, surprisingly, (5) the Chief of Veterinary Service.

In the Air Force, veterinarians do more than give medical treatment to animals. As everyone knows, the Air Force doesn't have animals in its "Tables of Equipment" —but there is a distinct need for specialists in Public Health. So in addition to providing clinical care and service for such animals as may be present on bases or owned by military personnel, the veterinarian supervises and inspects all base food-serving, preparing, handling and storage facilities. He works with the local health authorities and inspects local sources of food destined for military consumption. In effect, the veterinarian provides medical security against all diseases and ailments which may be traced to food of animal origin.

There are other added problems of a specialized nature that makes the USAF Medical Service a unique organization. Patient Air Evacuation, which started in World War II as an emergency measure, is now one of the Air Force's most satisfying jobs. Sick and wounded men from all of the services are flown thousands of miles from battlefronts to hospitals throughout the United States

Formerly, a staff of more than 125 medical personnel, including eight doctors, was needed to carry 300 patients on a 10,000-mile voyage in a hospital ship. Now, using aircraft, the Air Force can carry this same number of patients and get them all to their destination in far less time—with only three or four medical personnel in attendance.

The tremendous saving in personnel and time is especially important during a war, as forward hospitals can be kept clear for incoming casualties. In one eight-day period more than 14,000 patients were flown from Korea to Japan—3,192 of them in six hours.

Patient air exacuation also permits flexibility in assigning wounded to rear-area hospitals. Patients are whisked to specialized hospitals in groups of only 32 instead of traveling with hundreds of others and waiting their turn to be shipped on to the particular hospital designated in each case. An aircraft can be ready almost immediately to take off in any direction, and can carry the patient right to his destination instead of unloading him at a port where he must wait for further transportation.

From July to December, 1950, 15,643 men were flown from the Pacific Theater to the United States. Six thousand men were evacuated in December alone and as many as 448 arrived in the States on one day.

The Air Evacuation medical crew members are trained in the School of Aviation Medicine and are almost entirely Air Force Medical Service personnel.

Three agencies within the Air Force Medical Service are devoted to research:

● The School of Aviation Medicine which has discovered much information on physical, mental and psychological reactions of flyers to the physical and atmospheric conditions encountered in flight. This research is concerned primarily with the man as a human being.

● The Aero Medical Laboratory, located at Air Materiel Command headquarters, Wright Patterson AFB, Dayton, O., handles research on equipment which sustains the pilots and crew-members, makes them more comfortable and helps them operate more efficiently. Special installations at Wright-Patterson and at Edwards AFB, Calif., provide carefully duplicated conditions of all flight problems. Heat, cold, altitude, speed, acceleration, deceleration and other physical factors are studied. Day after day, tests are conducted to evaluate proposed equipment, develop new equipment, and determine requirements for other equipment to be used in the future.

First Arctic Aeromedical Laboratory conducts field studies designed to provide knowledge on how to live in cold weather.

● The Arctic Aeromedical Laboratory, actually a field activity of the Aero Medical Laboratory, is also assigned to the Air Materiel Command. Facilities of this Arctic laboratory are located in Alaska and concentrate on the medical, physical and psychological factors which confront the Air Force in the Arctic.

Among materiel developments resulting from aviation medical research over the years have been: the improved parachute, oxygen masks and systems, cockpit enclosures, standardized controls and control systems, improved instruments, ejection seats, pressurized cabins, protective harnesses, combat armor, emergency kits and rations, and many others. All these past developments are reviewed and improved constantly—and new development projects arise as planes fly faster and higher. END

Korean battle casualties arrive at Bolling Air Force Base for transfer to Walter Reed Hospital as part of patient air evacuation program.

HEADQUARTERS COMMAND

Life in a Goldfish Bowl

When you report to this outfit, you have no idea where you'll turn up next.

Food-service personnel get tips from famous chefs. Here, Nick Marchetelli of Washington's Mayflower Hotel explains garnishing.

ORDERS TO REPORT to Washington for assignment to Headquarters Command, USAF, give an officer or airman assurance that he will be assigned somewhere in the world—but that's about all.

One of the Air Force's smallest commands, the Headquarters Command has men scattered throughout almost every country in the world, doing everything from instructing Brazilian officers in the use of Yankee equipment to skirling a bagpipe with the Air Force's drum and bugle corps at Bolling Air Force Base.

Bolling AFB in Washington, D. C., Andrews AFB in nearby Maryland, and the USAF Special Activities Wing, headquartered at Fort Myer, Va., are the command's major components.

The Special Activities Wing, largely responsible for the command's outlying personnel, might be called the melting pot of the Air Force. Its morning report would leave the average topkick with a deep-seated case of the DT's.

The wing is spread all over the globe. It is parent organization for USAF personnel on duty with embassies, air attache offices, military missions, Mutual Defense Assistance Program offices, and other field activities.

But at home on Bolling AFB, 22 airmen of the command live a goldfish's life—and love it. Their bowl is the command's "model barracks." Spectators are a steady stream of high-ranking Army and Air Force officers interested in the latest thought on how airmen should be quartered.

The model barracks, if accepted as an AF-wide standard, is expected to lead to a greater percentage of reenlistment, with resultant savings in the cost of basic USAF training. The barracks is divided into 11 double rooms furnished with desks and desk lamps, built-in clothes closets, chests of drawers and modern beds. Each room adjoins a connecting semi-private bath with recessed tub and shower, complete to colorful plastic shower curtains. A combination recreation and living room is located on each floor of the barracks where—naturally enough—television has been installed.

Although not so elaborate as the model barracks, standard airmen's quarters in the command are cubicled into two and four-man rooms, each (*Continued on page* 156)

A "model airman" in housing experiment lives in a double room with a connecting semi-private bath.

Living room of ultra-modern barracks has lounge chairs, television set. Model housing plan eventually may be adopted throughout USAF.

At advanced strip in Korea, a Catholic chaplain holds services for American airmen. The "chapel," a hangar recently recaptured from the Communists, was riddled during the fighting by strafing U. S. fighters.

THE CHAPLAINS

'Tell It To the Chaplain . . .'

They serve everywhere — from the Arctic to the Korean front.

THERE'S a chaplain out in the Pacific who crowds as many as eight Sundays into a single month. Last Christmas he conducted *two* midnight services and at Easter *two* sunrise services.

This seeming magician is Maj. Stephen T. Mayer, Air Force chaplain at a mid-Pacific way-station for the Military Air Transport Service. Known as the "flying padre of Johnston Island" Mayer plays leap-frog with the International Date Line. His parish includes the atolls of Kwajalein and Majuro in the Marshall Island Group. The Marshalls are on the Asiatic side of the Date Line, while Johnston Island is on the U. S. side. So when the chaplain travels from one of his chapels to another he either gains or loses a day, depending on which way he travels.

Last Christmas Eve, Chaplain Mayer conducted his first midnight service on tiny Kwajalein, where more than 200 airmen and natives filled the quonset hut that serves as a chapel. Afterward, a MATS plane carried him 1,800 miles back across the Date Line where it wasn't yet Christmas Eve. And there, at the proper time, the chaplain held a second service for his regular congregation of approximately 40 military personnel and dependents.

While not all chaplains have such large parishes they serve with the Air Force wherever it goes. They have been with U. S. military aviation since its beginning as a part of the Army Signal Corps.

In World War II over 2,000 chaplains were on duty with AAF units throughout the world. They were ready to counsel, solace the wounded, and perform last rites for the dying. Sometimes the letters of condolence they wrote to families of dead airmen were the only personal messages these families received from the battle fronts.

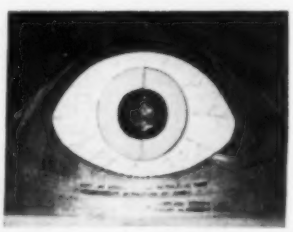
Since World War II, AF chaplains have given much attention to the development of a peacetime religious program. At bases throughout the world public worship is held and the sacraments are administered according to the rites of the religious faiths of all airmen. Bible and instruction classes are conducted for adults and the children of personnel. Chaplains also give practical aid to families of airmen and are immediately available to assist spiritually at scenes of air crashes. They act as advisors to commanders on matters of (*Continued on page* 152)

PHOTO RECONNAISSANCE

EYES of the AIR FORCE

ONE DAY late in World War II, German radars scanning the North Sea approaches to Europe suddenly picked up the blip of a lone aircraft flying very high and fast. The plane moved swiftly southward and passed over the German coast. Nazi jet interceptors climbed up after it, but the radar operators watching the speck of light on the scopes shook their heads. The plane was above 40,000 feet and soon vanished from the screen.

A few days later, another of Germany's rapidly disintegrating industries received a staggering attack by 600 bombers of the 8th Air Force. Then, before the smoke had cleared, the lone blip reappeared. German radar operators again watched the tiny point of light curve over the smoldering target area. It was even higher this time, and was moving much faster than before. The German interceptors missed contact again, and the speck of light that disclosed the presence of an American photo reconnaissance plane eight miles up in the German skies soon disappeared completely from the radar scope, following a flight path north across the English Channel.



Insignia of photo recon outfit is bloodshot eye painted on nose of SAC RB-45 reconnaissance jet.

As usual, photo reconnaissance pilots had been first and last over the target. Another bombing mission was completed, with the help of reconnaissance to photograph the target in advance and to check up on damage after the raid.

Before the big bombers of the Strategic Air Command fly their missions, other planes must go ahead. These are the aircraft whose war job is strategic reconnaissance. They go out and bring back photos and information on key target areas to guarantee that the bomber pilot will know exactly where his bombs are to hit.

It is just as important for the recon plane to take aerial photographs *after* a bombing strike. The purpose of bomb damage assessment is to determine whether the target has been thoroughly destroyed or whether it will be necessary to go back and hit it again. During World War II both the Germans and Japanese camouflaged many of their factories to look as if they had been com-

Preparing map, experts from a strategic recon unit complete a mosaic from dozens of aerial photographs.

Newest reconnaissance plane of Strategic Air Command is fast, four-jet RB-45. It carries 18 aerial cameras (left) for varied photographic missions. Remarkable air view of Los Angeles (below) was taken from RB-45 flying at over 40,000-foot altitude. Latest reconnaissance planes are equipped to take radar photos at night or at times when weather conditions obscure the target.

pletely demolished. They were able to maintain 60 to 70 per cent production in these factories until low-level photo recon told the true story and insured the effectiveness of subsequent bombing attacks.

Day after day, simulated combat missions are flown from Air Force Bases over the U. S. and overseas. Assume you are the pilot of an RB-45, the reconnaissance version of the four-jet B-45 bomber. You are assigned a night radar photography mission over Birmingham, Ala., one of a number of U. S. cities selected as "target" areas because they resemble foreign cities or because they have a peculiar location that makes them good tests for radarmen.

Radar photography can be carried out from high altitudes—and in spite of darkness or heavy clouds. So if you fly at night it won't be necessary to descend to low altitudes as would be the case if you were assessing bomb damage.

At three o'clock in the afternoon before your mission, you and your crew are briefed. The squadron operations officer explains the objective and the reason the photography is needed. The intelligence officer explains electronic counter measures, ground control, radar nets, and any restricted areas which may be encountered. The photo officer gives you details on the photography required. The squadron engineer, weather officer, flying safety and personal equipment officers all take part. Then you are given a "profile" of the mission, showing the climb to altitude, the cruise to the target area, the altitude from which photography will be accomplished, and return. You examine charts of the area and possibly look at previous radar photographs of the target.

You and your crew—a co-pilot and a photo-radar-navigator—ask questions, and (*Continued on page* 168)

Cameras Over Korea

Communists were shooting at the RF-80 jet photo plane when it screamed over the Inchon, Korea, sea wall at 500 m.p.h. to take this picture. Day was gray and rain was falling but photos enabled estimate of the wall heights, later found to be correct within one foot.

THE PHOTOGRAPHIC LABORATORY

These are some of the 'impossible' photos taken by Air Force photographers overseas.

AT NIGHT, the enemy lines in Korea flare into action. The long supply lines from Manchuria begin to move. Peasants come out of hiding and trudge southward, bearing ammunition and supplies on their backs. Trains begin to crawl. And convoys with all lights extinguished roll over rutted roads toward enemy supply dumps.

While the sun shines, the Chinese Communists and the North Koreans get few supplies up to the front. But when the weather closes in, or while the darkness hides the vehicles, the supply lines galvanize into movement.

Probably in no other war in history has constant intelligence regarding enemy night activity been as important. American troops hadn't encountered Korean-type tactics since they last whipped the Apaches. This was a war where darkness was a primary factor.

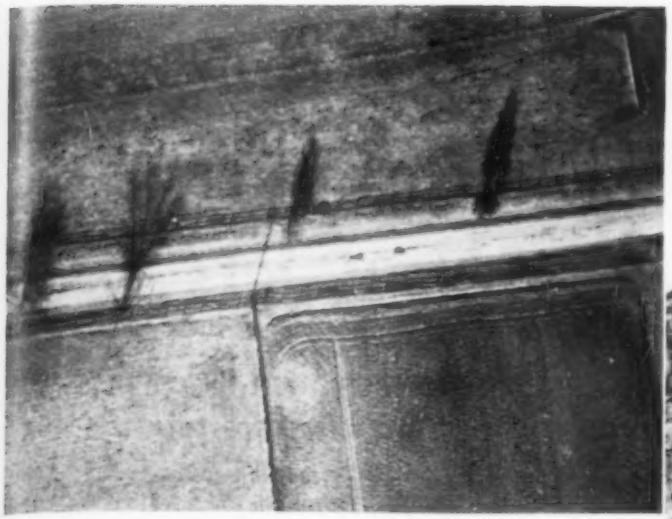
In spite of excellent daytime photo intelligence, UN troops found they were constantly in trouble because of enemy movement at night.

When the North Koreans crossed the 38th Parallel last June the Air Materiel Command's Photographic Laboratory had almost completed development of a new system of night aerial photography which could be used at low altitudes by high speed aircraft.

This was a system of carefully worked out parts rather than a new gadget. There was a flash cartridge which could be discharged from a photo plane to give sufficient illumination for a night picture from 3,000 feet. There was a discharger to put that cartridge burst accurately in the sky in relation to the photo plane. And, of course, there was a camera system tied in with the discharger so that its shutter would open at the precise time when the flash cartridge exploded.

We wanted a system that wouldn't confine us to taking individual night pictures from relatively high altitudes. We needed a way to operate on the deck at high speed, running off overlapping pictures in strips. That would permit us to take photographic "slices" of terrain behind enemy lines to detect unusual activity or attempted surprise movements.

During the dark days while UN forces were retreating

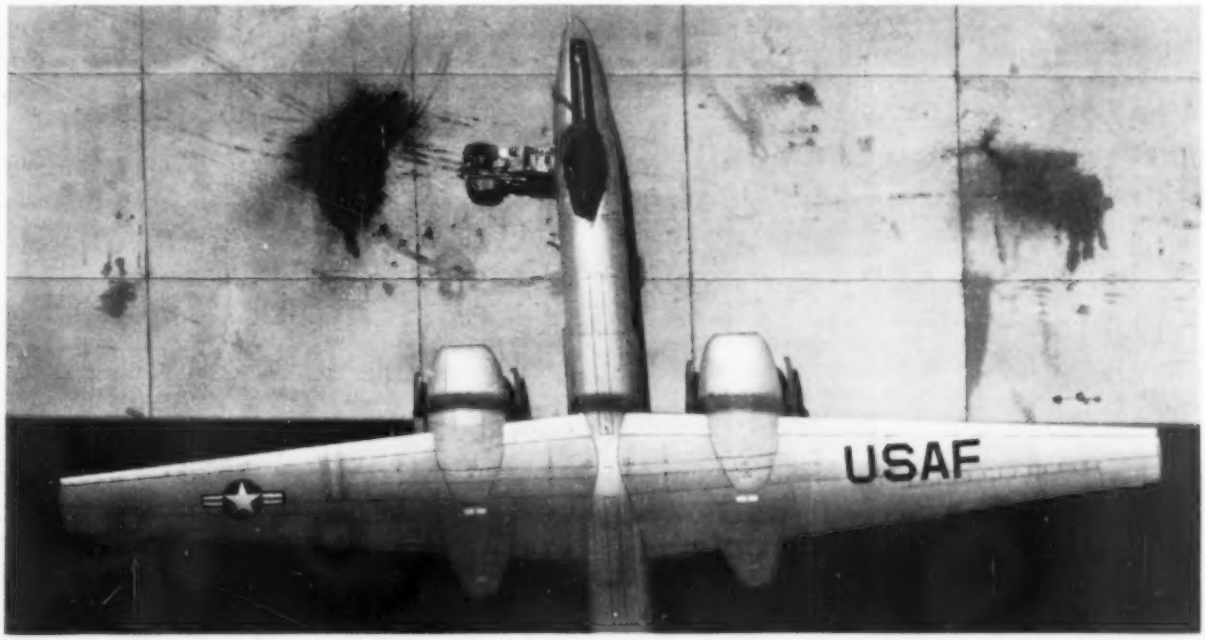


Taken from 35,000 feet (almost seven miles), photo at left is clear enough to show fence posts by side of road. The picture was shot with a K-30, 100-inch, aerial camera.

Korean village (below) was photographed 15 minutes after sundown from plane flying 500 m.p.h. at 1,000 feet. This is part of a stereo pair. Note individual railroad ties.

southward to the savage defense perimeter around Pusan, a section of the Photographic Laboratory at Wright-Patterson Air Force Base began working around the clock. We expanded a single experimental night photo rig into a number of units to go into a number of RB-26 photographic airplanes. This was a "blitz" operation the like of which most of us had never seen before.

Machinists, welders, electricians and engineers worked hundreds of hours building relays, timers, photo cells and dischargers. Ordnance Corps, which had done a magnificent job in furnishing us with the original flash cartridge, was asked to manufacture them in quantity—and to pack more than 100 million candlepower of blue-white light into a 15x2-inch cartridge case without increasing its size or weight. (*Continued on page* 176)



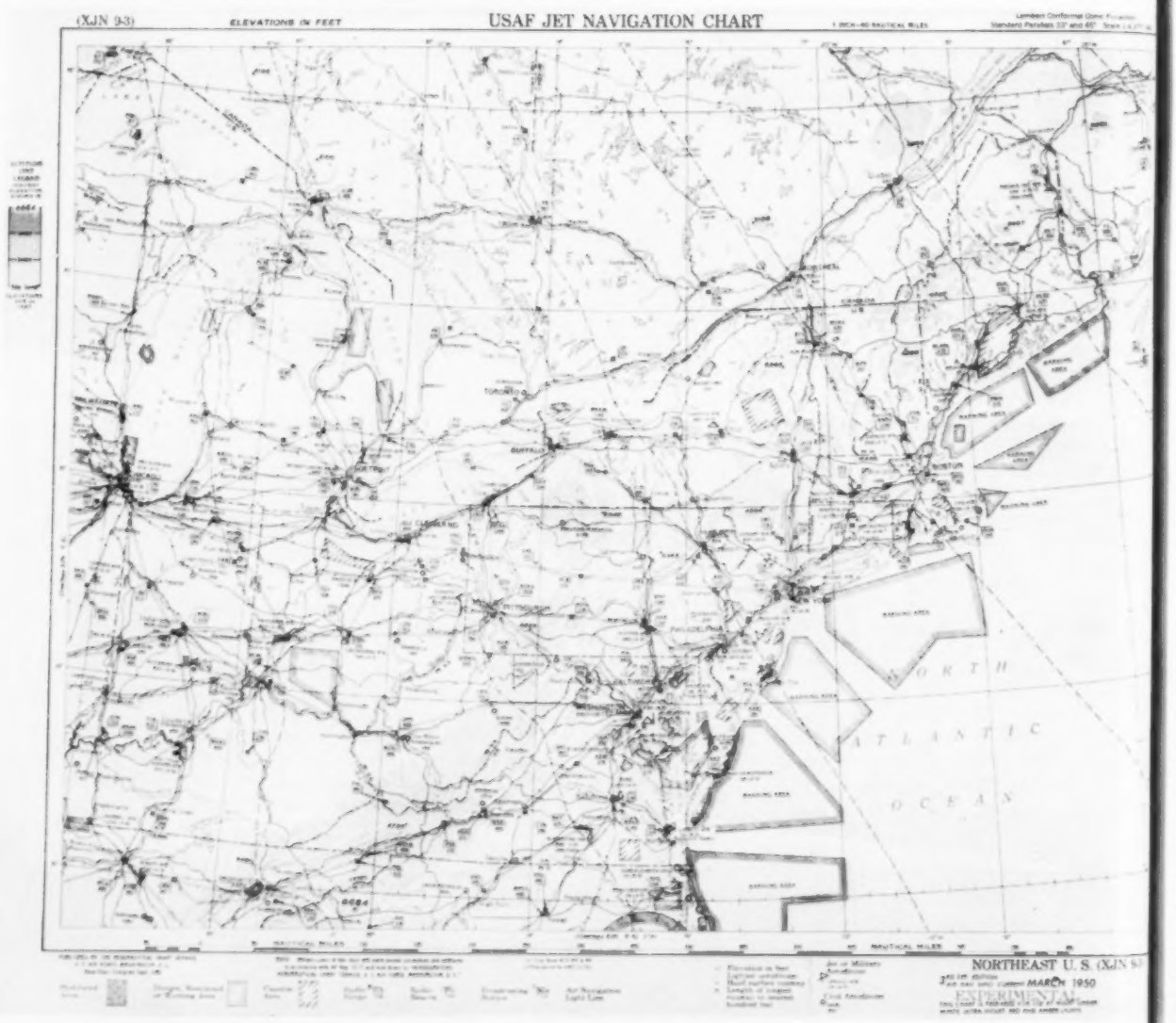
Count the rivets! This photograph, taken at 500 m.p.h. and at an altitude of less than 100 feet, was so sharp that individual rivets could be counted in the B-45's fuselage. Picture was shot with a strip camera at Wright-Patterson AFB in the U.S. A strip camera has no shutter, receives ground image on a moving strip of film synchronized with the plane's ground speed. Robot-like automatic scanners, capable of analyzing aircraft speed by optical pickup directly from the ground, control speed of the film.

Standard jet instrument letdown charts are extremely awkward to handle in flight. Experimental chart (next page) is handier.

AERONAUTICAL CHART AND INFORMATION SERVICE

New Charts For New Jets...

With these streamlined maps, it's no chore to fly jets cross country.



Experimental jet navigation chart is on a scale of one inch to 60 nautical miles. Six charts cover the entire continental United States, compared with 43 WAC charts needed to cover the same territory. Three of the new jet charts span the northern half of the country and three the southern. On back of chart are the airways and necessary radio data for the same area covered on the face.

ABOUT TWO YEARS ago, the crew of a Boeing B-47 jet bomber attempted to use the standard World Aeronautic Chart (WAC) in making a transcontinental flight from Moses Lake, Wash., to Andrews Air Force Base, Washington, D. C.

The WAC's are produced on a scale of 1:1,000,000. One inch on a WAC chart represents approximately 14 nautical miles on the earth's surface and the average pilot finds the chart completely adequate for navigation. But when the B-47 crew had finished cutting a strip chart for use on its flight, they found they had a map 16 feet long! That is hardly a suitable length for even a big aircraft, let alone the cramped cockpit of a jet bomber.

The incident illustrates one of the big new problems of the Aeronautical Chart Service (ACS) of the Air Materiel Command. Final answers are not yet at hand, but the Chart Service has made a big advance in answering some of these questions: What shall the scale be? What size? How much information must be shown? How many charts must a jet pilot use? Can they be handled easily in his limited cockpit space?

When the Aeronautical Chart Service learned of the difficulties met by the B-47 crew, ACS representatives interviewed the pilot and developed a "pre-navigated chart." It was only 37 inches long and covered the same route. Check points, times and distances were indexed on the top and bottom of the chart. Photos were fixed near check points to provide visual confirmation of the ground positions. The chart was used successfully on the return flight but its limitations were apparent. For one thing, it could not be used if the pilot changed course.

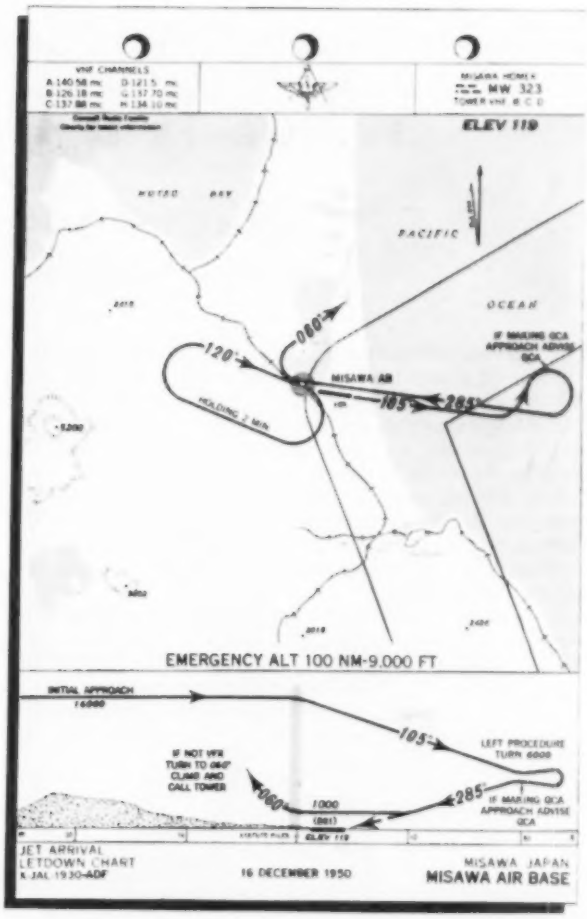
Then the 1:2,000,000 chart was developed to provide all necessary charts in book form. It was only about a fourth as big as the WAC chart and much detail which appeared on the WAC was eliminated. The omitted detail was that which could not be seen normally from high altitudes.

In July, 1949, two officers of the Aeronautical Chart Service decided to try an experiment of their own on a B-25 flight from Los Angeles, Calif., to Washington, D. C. They navigated successfully with a 1:5,000,000 planning chart despite the lack of customary detail. The pilots realized immediately that if a B-25, slow and low-flying by jet standards, could be flown with such a small-scale chart, jet navigation could be accomplished the same way without difficulty.

So work was begun on a new chart. The special requirements of jet navigation were studied. The result was the publication in November, 1950, of a series of experimental jet navigation charts on a scale of 1:4,377,740—or exactly one inch to 60 nautical miles. These charts, six in number, cover the entire continental United States, as contrasted with the 43 WAC charts required to cover the same territory. Three of them span the northern half of the United States and three the southern.

A jet pilot requires only three of these charts, as against 13 WAC's, to fly from San Diego, Calif., to Presque Isle, Me., or three as against eight WAC's on a trip from San Francisco, Calif., to Washington, D. C. Each chart is only 15½ by 18½ inches in size.

These new charts present a "picture pattern." They are designed to depict the earth as nearly as possible as the jet pilot sees it from his high altitudes. Easily identifiable cities, trunk railroad lines, super-highways, rivers, lakes, etc., appear, but hamlets, small streams, unimportant roads and airfields unusable by jets are not shown. Powerful radio stations are emphasized, as are military airfields, the runway patterns of which are indicated. Contours are not emphasized but gradient tints and spot elevations inform the pilot of altitudes. Shapes of mountain masses are depicted and color is employed in such a way as to show the general land mass rather than details.



New jet arrival letdown chart is printed here nearly in same size. It is 4½x7 inches and pilot can hold it in one hand during flight. Charts are assembled in books with clear Plexiglas covers. On back is an area chart for planning or diversion to another field.

A revolutionary feature of this new chart is the information contained on the reverse side. It includes the airways and all the radio information required for use on or off the airways, providing on a single chart all the data required by the pilot. During pre-flight planning he may write in any changes in radio information by consulting his radio facility chart, thus keeping it current.

A further aid is a scale in nautical miles printed on each edge of the reverse side. A user thus may fold the sheet over and immediately measure distances on the navigation chart. Subsequent revisions are carrying such scales on both sides of the chart.

These navigation charts are not "the last word" in jet navigation charts. Tests are still being made, and similar charts for other geographical areas of the world will have to be prepared.

But the problem of navigation charts for jet aircraft can be written off as solved.

Quite different problems have been encountered in making jet arrival letdown charts. The first chart of this type was eight by 10½ (*Continued on page* 176)

What Is a Combat Wing?

The experts don't talk about groups any more. A wing's the basic Air Force unit.

WHEN NEWSPAPERS say the Air Force has activated a B-50 group, most persons think of the 30 big bombers and the some 310 men who fly or direct them. But behind these planes and flyers are 795 other officers and airmen, the rest of a combat group, who keep the strategic bombers in the air.

And behind each combat group are 1,195 additional men who handle maintenance and supply, maintain the airbase, run the medical units and staff the headquarters.

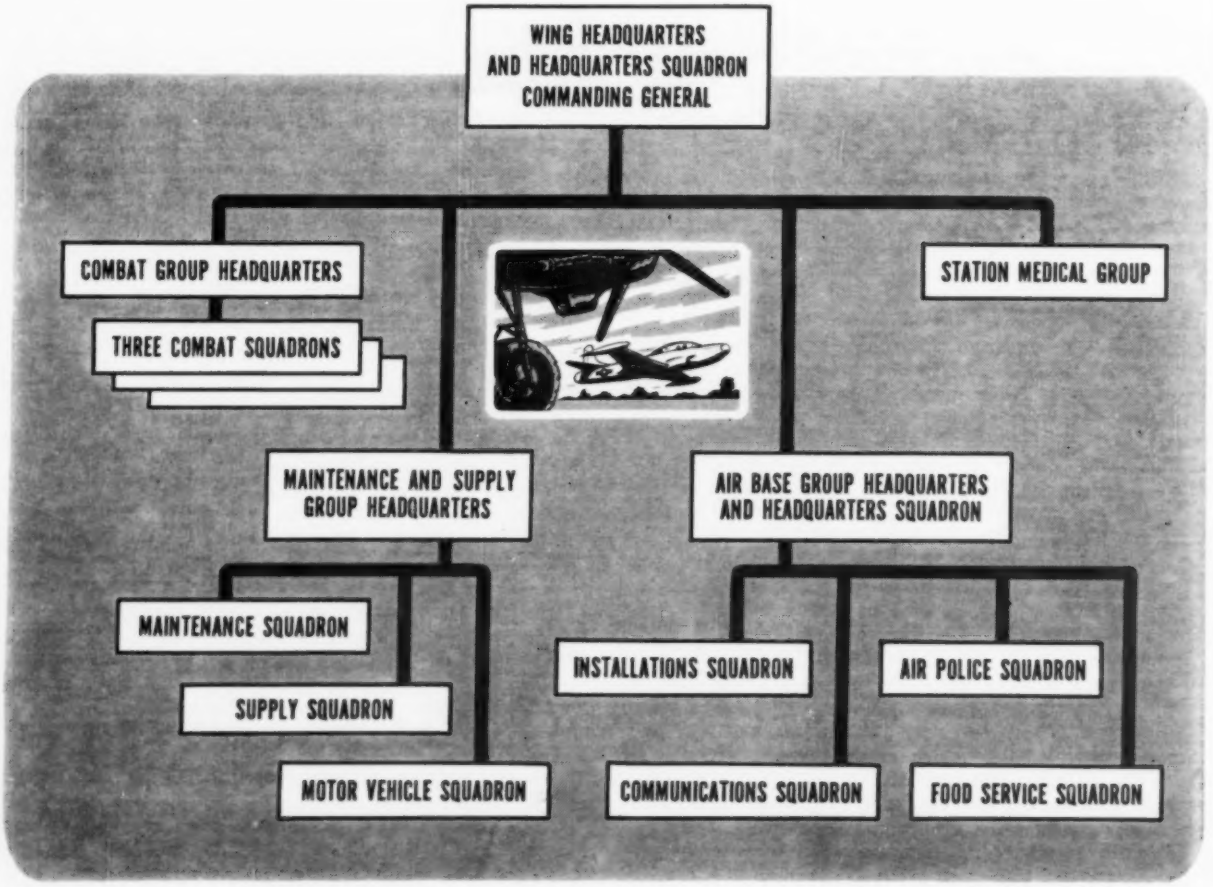
These 2,300 men constitute the Air Force's basic unit—an Air Force Wing.

Each wing is composed of a combat group, three supporting groups and a headquarters unit, all commanded by a brigadier general. The striking force of the self-sufficient wing organization is the combat group—the outfit that flies the fighters or bombers. In peacetime, the group has three squadrons; in wartime, it has four, and with the development of in-flight refueling a refueling squadron may be added. This refueling outfit will have 12 planes and 233 men (included in above figures on total personnel).

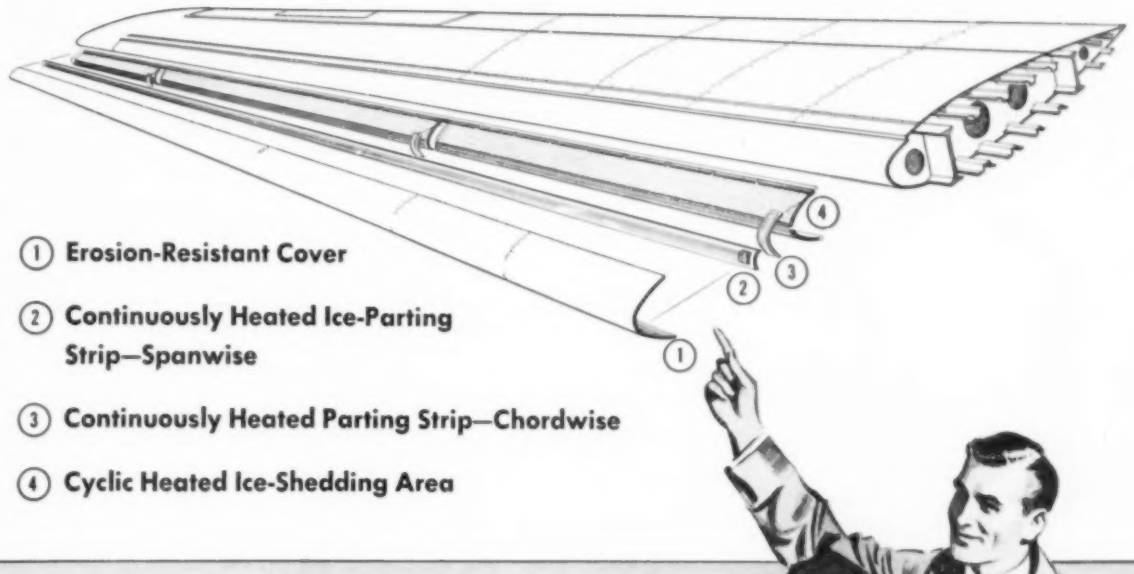
Air Force wings are mobile and self-supporting, capable either of operating out in the field or at established stations.

In the past, the Air Force has talked about groups instead of wings; but the well-known 70-group program, for example, was actually a plan for 70 groups *plus* their supporting units.

Because use of the term groups alone has been misleading, the Air Force now speaks of wings in connection with its expansion program. Currently, the Air Force has an objective of from 95 to 100 wings with a strength of 971,000 men. This means the Air Force will have 95 to 100 fighting groups plus all their supporting units. END



TYPICAL DIAGRAM OF GOODYEAR ELECTRO-THERMAL ICEGUARD


1 Erosion-Resistant Cover
2 Continuously Heated Ice-Parting Strip—Spanwise
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4 Cyclic Heated Ice-Shedding Area

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eliminate icing hazards

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CLEVELAND MODEL & SUPPLY CO.
4507E4 Lorain Ave. Cleveland 2, Ohio

Communications

(*Continued from page 82*)

but now, as in World War II, the fundamental circuitry of the system is operated by the Air Forces.

In some areas, in the interest of economy, the Air Force utilizes allocated channels in the circuits of the Army and Navy. The Navy, for instance, furnishes a channel from Washington to the Caribbean Air Command, and the Army furnishes channels from Washington to Air Forces in Europe. The Air Force also leases commercial circuits from Washington to the United Kingdom and from the United Kingdom to the U. S. Occupation Zone of Germany.

In keeping with other military developments, this communications system is being modernized and expanded. Plans are being implemented to permit the principal commanders to deploy and control their forces with the security and accuracy necessary to exploit to the fullest the range, mobility and firepower of which modern aircraft are capable. These plans, Globecom and Plan 51, provide for a continuation of the present policies of economy and cooperation with the other services.

Closely allied to air communications is the field of electronic warfare, which embraces the related families of airborne and ground radar, radio and radar countermeasures, and electronic navigation.

This is particularly emphasized in the structure of the Air Defense Command, which employs (1) the long range search radars, (2) ground control intercept radar, (3) identification and recognition systems, (4) the communications network required to convey intercept intelligence to control centers and (5) communications circuits to fighter commands which are on the alert to scramble and intercept an enemy.

A complex aggregate of airborne and ground radar facilities, countermeasures facilities, and air communications facilities combine to form a system which will permit the commander of the Strategic Air Command to position his forces most advantageously to launch an attack against distant targets, to control and guide accurately his force to those targets, and to regroup his forces with a minimum of losses after their attack. Similarly, the Tactical Air Force commander has at his disposal an integrated communications-electronics system by means of which he can exercise the precise control required by the exacting nature of air/land warfare.

The necessity of close integration of communications-electronics and operations has made it necessary for communications personnel to be integrated into the Air Force organizational structure. It is only through a comprehensive knowledge of operations that the communications men can provide the operating commands with systems which will match the capabilities of modern planes.

In the field of logistics, the Air Force has observed the same organizational principles as in the field of operations. Communications-electronics is an organic part of the logistical structure, just as it is an organic part of the operating structure.

Through the agency of the Joint Communications-Electronics Committee of the Joint Chiefs of Staff, the Air Force is continually effecting the maximum economy of operation consistent with its mission. In this committee the military services work out joint operating procedures, eliminating duplication, and review the military characteristics of all items of equipment to see that it meets joint requirements.

Historically speaking, it has taken many years of effort, and in some cases, hours of argument, for the Air Force to develop the organization and the means that best suit its needs. The present system is not perfect, nor fixed, but it is good. END

Personnel

(*Continued from page 69*)

intelligence officer or an administrative officer.

The big factor that will determine your Air Force job will be your own talent and background. When you report to your first base you'll be given aptitude tests. And you'll be interviewed. Then, on the basis of these tests, interviews, your civilian background, your civilian occupation, and your academic history—plus your own desires—you'll be assigned to technical or on-the-job training. Maybe, if you're already an expert in some civilian field, you'll be assigned directly to a job related to your civilian experience.

But whatever your first assignments, you'll have a chance for advancement in the new Air Force.

An Air Force personnel plan, called the Airmen Career Program, will be explained to you. You'll be told about the career plan that re-defines the entire "job structure" of the Air Force. It provides what the personnel people like to call "job ladders" up which you can climb in any skill, craft or administrative ability required by the USAF. As your skills are broadened, you can climb right up through the seven rungs—each representing a level of ability required by ranks from private through master sergeant and warrant officer.

And if you complete flight training or OCS and, as Lieut. Robert Doakes, intend to make the Air Force a career, you've got an excellent opportunity. A new program, recently developed for officers, charts levels of responsibility through junior officer, senior officer and staff officer jobs.

One thing is quite plain to Robert Doakes, the recruit from Cape Girardeau: the Air Force personnel system is designed not only to get the best men for the USAF, but to furnish a tremendous range of career fields for the men who make the Air Force run. END

The Birdmen's Perch

Hold tight, Kiddies, the safety boys are at it again, and as usual making plenty of sense!

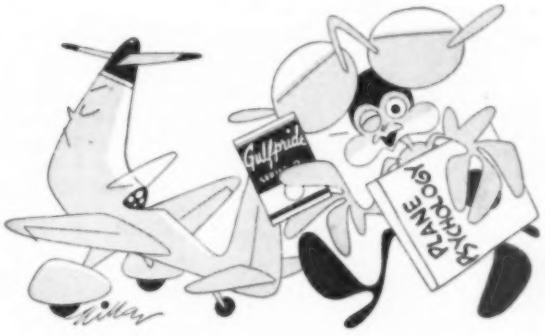
This time it's shoulder harnesses, those ingenious little devices that keep a pilot from folding up like a Parker House Roll if he crashes.

Sure, your safety belt will reduce the danger of an accident, but it can't hold a candle to a shoulder harness when it comes to over-all protection.

Now, let's assume you're coming in for a crash landing wearing a shoulder harness. Oops, watch that house, look out for those trees! CRASH!

See—what did we tell you! Instead of doubling up like a two-bit jackknife, you just sat there and let the harness take up most of the shock. And notice, Ferdie, your head's still against the seat instead of bumping against the instrument panel. Hey, Ferdie, speak to me!

But all kidding aside, shoulder harnesses are sure to reduce the seriousness of a good many mishaps!



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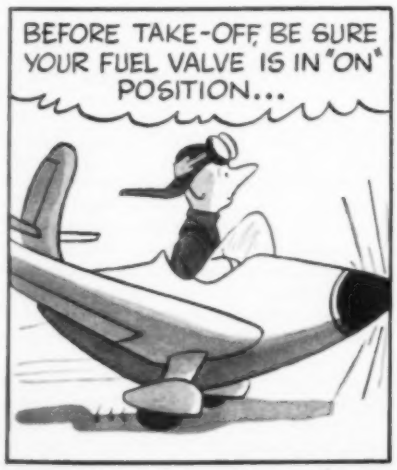

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Far East AF

(Continued from page 49)

bombs left two of them in twisted wreckage, with another badly damaged.

In the darkness back in Southern Japan, Combat Cargo Command loading crews wrestled with boxes of ammunition, rations, bombs, and rockets for the morning's B-29 mission. A fork lift eased up to a waiting C-54 of the 374th Troop Carrier Group. The steel prongs of the lift raised box after box of supplies and shoved the cargo into the open door of the transport. Nearby, "gaping-jaw" doors of a 314th Troop Carrier Group C-119 (*Flying Boxcar*) swung wide to receive a 10-ton steamroller, needed by the 812th Aviation Engineer Battalion, which was repairing an airstrip that had been battered by heavy cargo planes.

Teams pulled, pushed, and tied down heavy cargo all night long. They loaded *Flying Boxcars*, *Skymasters*, *Skytrains*, and *Commandos* of the 437th, 374th, and 314th Troop Carrier Groups, which are part of FEAF Combat Cargo Command. Once loaded, the transports would shuttle from Japanese on-loading points to UN airfields in Korea. On return flights, these planes would be jammed with casualties, supplies, and equipment, evacuating them from strips in Korea in support of withdrawing UN ground forces.

Dawn broke Friday. At "Dogpatch," Korea, F-80 jets of the 51st Fighter-Bomber Group raised clouds of dust as the pilots fired-up to taxi out for take-off, armed with napalm and rockets for a strike against Communist positions that sprawled from Wonsan west to Pyongyang.

As the planes taxied over the pierced-steel planking they balanced a huge glittering fuel tank under each wing. These were no ordinary jet wing tips. An engineering officer at an airbase in Japan had redesigned the Fletcher wing tank first carried by *Shooting Stars*. FEAMCOM (Far East Air Materiel Command) experts in Japan modified the tanks in use, increasing the capacity by almost 100 gallons and stretching the jet's range by nearly an hour.

Farther north, on a thin, rubble-concrete runway, *Mustangs* of the 6131st Tactical Support Wing left to deliver 500-pound bombs and machine gun slugs on Communists swarming down from the Yalu River boundary. F-51's of the 35th Fighter Group joined in tight formation shortly after dawn. Some flights carried rockets and .50-calibers. Others had napalm, along with rockets and ammo. One flight had 500-pound bombs tucked under the wings.

The most surprising plane of the war—the T-6 (*Texan*) turned "Mosquito"—took off from a Korean airstrip and climbed to find targets for fighters and light bombers already in the air. Early in the war, a squadron commander of a spotting unit, at the time using liaison planes, discovered the value of the T-6 in locating enemy positions and concentrations. Thereafter, the Mosquito pilots, with an Army observer in the back seat, found all kinds of Communist positions. So effective was this spotting of targets by the Mosquito crews that captured North Koreans thought the T-6 contained a secret listening device to pick up sounds on the ground.

The Mosquito left its base carrying six rocket rails with phosphorous and smoke grenades under its wings. An Army observer in the back seat spotted a camouflaged artillery position and alerted the Mosquito pilot, who radioed the position to an Air Force controller in a jeep on the ground. Shortly the fighters came, trailing the thin ribbon of black smoke which often follows a streaking *Shooting Star*. Two jets peeled off to blast the enemy artillery.

Screaming down between two jagged hills, the "planes with the noise behind," as the Koreans dub them, dropped two napalm bombs and fired five rockets.

Another jet strafed Red troops scrambling from the area. After the attack, 20 Communists sprawled at the edge of some trees.

On Friday, the planes were readied again in the dim pre-dawn light. B-29 crews sat in briefing, noting descriptions of targets, locations of flak, sightings of Communist fighters. They also heard reports of two four-engined "strangers" flying along the Yalu River. Then the weatherman got up.

"There will be some cloud coverage in North Korea, particularly along the east coast. Middle clouds will hang over the central sector and along the battle lines in the south." He pointed to the places on a map as he spoke. "The clouds will be high enough to allow the fighters and B-26's to fly their close support and interdiction operations. B-29 targets possibly will have to be bombed by radar."

Briefing ended. *Superfort* crews gathered up flying clothes and kits, then trailed out to trucks to ride to their planes. The mission was on—both in Japan and Okinawa.

One formation arrived over Sukchon at 10:30 a.m. carrying 1,000-pound demolition bombs. The middle clouds strung out over the sky but through a hole that fortunately appeared south of town, the B-29's walked their 1,000-pounders down 2,500 feet of marshalling yards and through the industrial section of Sukchon. Huge fires towered smoke into the morning skies.

Another town—Sunchon—was important to the Chinese and North Koreans. Its rail system, photos revealed, was a key transportation center. Supplies were stocked there in mass for shipment by train. But at noon this Friday, the rail and marshalling yard was converted to rubble.

At 1:15 p.m. the town of Kanggye had a formation of visitors: 307th Bomb Group *Superfortresses* methodically hammered this rail and highway hub in northwest Korea. More than 20 airplanes dropped 176 tons of bombs in a metallic rain.

Southwest of Chongsongjin a flight of B-26's from the Third Bomb Group looked for targets of opportunity. To knock out any enemy trains, troops, or concentrations they might find, they carried nose guns, with rockets and fire bombs

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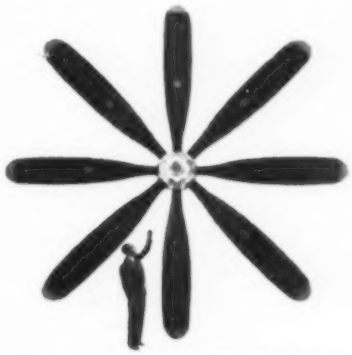

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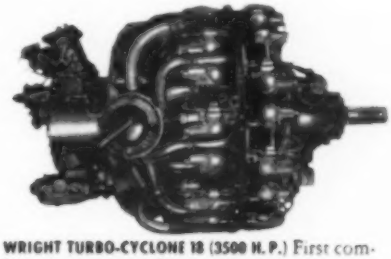

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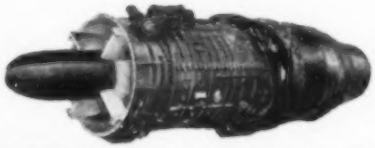

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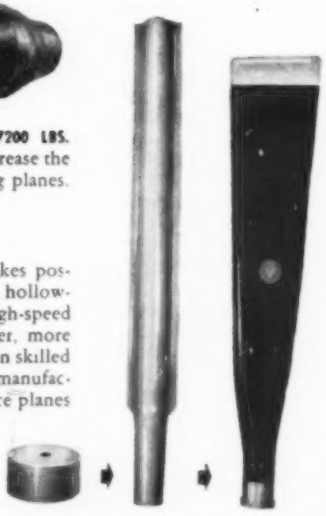

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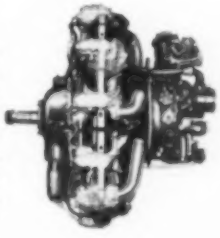

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shackled under both wings. The flight leader of one formation from the 452nd Wing suddenly sighted a train a few hundred yards from a tunnel. Perhaps the engineer saw the B-26's but he never reached the tunnel. Rockets and machine gun slugs punctured cars and locomotive. The pilot pulled up in a steep climb—four cars exploded, and the locomotive went up in steam and flame—one confirmed ammunition train.

Another flight of B-26's cut supply lines which had been photographed by planes of the 162nd. Tactical Reconnaissance Squadron. They plastered a rail line, set two supply buildings on fire, and knocked out the supports from under an important concrete bridge.

Four *Shooting Stars* were at altitude just south of the Yalu River. They watched 24 Mig jets, latest Russian contribution to the war, take off from Antung Field, across the river from Sinuiji. The communist fighters, with stubby, swept-back wings, climbed up on the Manchurian side of the river to start their raid on the 49th Fighter Group jets. The four *Shooting Stars* tore into the Migs when they got south of the border. Some Red planes stayed out of the fight, doing acrobatics off on the flank. Others, who lasted the 15-minute scrap, were wary of aggressive F-80 two-plane elements. When the dogfight ended, one Mig trailed whitish smoke, another was reported as probably damaged and all 24 of them high-tailed to their haven in Manchuria.

All along the front, *Mustangs* of the 6131st and 18th Fighter Wings played havoc with Communists.

Communists in positions on hills between Sinwon-ni and Kumchon looked up to see a new FEAF jet in action. A flight of F-84's (*Thunderjets*) blazed over the hills in an armed reconnaissance mission. These jets of the 27th Fighter Escort Group had arrived from the United States early in December. The Communists didn't look long. Armed with rockets, six machine guns, and fire-bombs, the F-84's killed or wounded an estimated 600 of them before completing their mission.

Toward mid-afternoon, four Migs climbed out of Manchuria along the border. The Red flight leader must have looked up, because he kicked full right rudder in a sharp turn. What he saw was startling. Plummeting down from 25,000 feet were four F-86's (*Sabres*) of the 4th Fighter Interceptor Wing. Knifing down on the Migs at over 600 m.p.h., these latest arrivals in FEAF's fighter arm smothered every attempt of the Migs to maneuver and escape.

The Communist flight leader frantically tried to dive away, but a *Sabre* pilot turned inside him, pressed the gun trigger, and sent .50-caliber slugs raking the fuselage of the Red jet. Smoke billowed out of the crippled plane, and in a screaming, uncontrolled dive, it burst into flame. The other three Migs scattered—the dogfight was over.

Far to the north, a FEAF F-51 was hit by small arms fire. The pilot pulled up as flames scorched the fuselage. After yanking his canopy release, he shoulder-rolled off the wing, jerked the chute rip-cord and floated a scant 500 feet to the ground. His wingmates strafed the advancing Reds, made them run for cover, then radioed the position of the downed fighter to Third Rescue Squadron's detachment at a Korean base.

A helicopter pilot soon was hovering over the scene of the crash. The fighter pilot watched the 'copter settle to the ground amid heavy burp-gun and rifle fire. Chinese broke cover and ran toward the burning F-51. The fighter pilot sprinted to his rescuer, who promptly pulled him up into his helicopter as it climbed back into the air. Less than an hour later that pilot was back at base, shaken up—but saved to fight another day.

At a Korean base, casualties were arriving in large numbers. A medical service lieutenant checked lists and talked with Army field hospital commanders to finish his casualty rosters and evacuation schedules. A graying, tired-faced flight surgeon supervised placement of litters in C-47's, R5D's, and C-54's. He watched closely over the more seriously wounded, adjusting chest-wound breathing tubes and bandages. A flight nurse of the 801st Medical Air Evacuation Squadron gathered up her medical kits while her assistant carried heavier equipment. Both climbed into the loaded transport to care for their patients en route to hospitals in Japan.

Battle-scarred Friday wore on through late afternoon. Toward dusk, an RB-26 from the 45th Tactical Recon Squadron circled near the east coast to photograph results of earlier air strikes. The middle clouds had dispersed. The pilot was VFR. He saw much below. A whole communist supply center was still burning, with smoke rising to 6,000 feet. Hundreds of dead camels, horses, mules and pack oxen blocked tediously narrow roads. In front of UN front line positions were dead Chinese piled high. But the battle was still continuing.

Late that night in Japan, rapid-working Military Air Transport Service personnel completed loading a giant double-deck *Stratocruiser*, a C-97. Its passenger list of 60-odd wounded were on their way to the States.

Friday ended. Saturday was at hand, and it would be another day of FEAF at war. END

Air University

(*Continued from page* 119)

was radioed to make an emergency stop at Johnson Island, some 500 miles southwest of Hawaii. An airman had been critically burned from his hips to his chin and immediate evacuation to a hospital was imperative. He was taken aboard without incident, but complications developed in the air.

Due to the critical shortage of Flight Nurses, a regular nurse had been assigned to the flight. While highly competent in her own field, she had not received Flight Nurse training and consequently did not recognize certain flight-induced symptoms or realize the necessity of in-flight oxygen therapy. But Sgt. Eugene E. Smith of the 1736th Air Evac Squadron, an Air Evacuation Technician trained at the aeromedical school in 1949, was aboard. He recognized critical danger signals in the patient's reactions. Upon his own initiative he administered oxygen therapy and the patient, in a much revived condition, was landed safely at Honolulu for admittance to Tripler Army Hospital.

Capt. W. H. Liggitt, Medical Service Corps officer in charge of Air Evacuation Technicians with the MATS 1736th Air Evac Squadron at Brooks AFB, Tex., says that it would require 150 flying hours (approximately five months time of on-the-job training) to give a medical technician the same qualifications as an Air Evacuation Technician. But the School of Aviation Medicine trains these Air Evacuation Technicians at its Gunter AFB branch in only six weeks.

Engineering courses started in 1919 at McCook Field, Dayton, O., were the forerunners of a larger program now directed by the USAF Institute of Technology. The Institute selects qualified officers to be trained. It also monitors the training-in-industry programs to which officers are detailed for periods ranging up to 18 months. These officers actually participate in industry's management and operating functions.

Since the beginning of the Korean crisis the trend has shifted towards graduate work. With the need for a rapid development of new weapons and improved aircraft the requirement for advanced training in highly specialized fields is recognized.

Emphasis has been placed on the fields of nuclear physics, biological and nuclear chemistry, guided missiles, meteorology and all engineering specialties. Recently a course in nuclear engineering combining nuclear studies with appropriate curricula in engineering, has assumed high priority.

Besides preparing officers for assignments in research and development projects the institute has foreseen a requirement for leaders in this field. To fill this need, highly qualified officers are being selected for a special 15-month graduate-level course to be conducted at the University of Chicago. This course will prepare them to be executives for the administration and development installations.

Long recognized, but until recently not emphasized, is the role of psychology in the efficient handling of the newest tools of war. Of increasing importance is its application in the design of tools of war and equipment—such as the location and design of control knobs and levers in aircraft.

Last fall the Air University Far East Research Group for Human Resources was organized by the Institute to study

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human factor problems in the Korean war. In cooperation with the Korean Ministry of Education this team asked prominent Korean social scientists to join with them in a study of Communist control in conquered areas. The response of the top-flight South Korean research professors was gratifying. Leaders in sociology, psychology, political science and history joined the team as staff members during their study in Korea. Most of these scholars had had graduate training in the United States and thus were able to work closely with the Human Resources Research Institute team. They made studies of Communist control in the city of Seoul, in a village about 40 miles south of Seoul, and in the city of Pusan. They interviewed residents in these places as well as refugees who were fleeing from the North Korean and Chinese Red armies.

The USAF Extension Course Institute, located at Gunter AFB, Montgomery, Ala., administers the USAF Extension Course Program.

These courses parallel so far as practicable the courses presented in resident Air Force schools. The purpose of the program is to provide a means whereby reserve Air Force officers and airmen may have the opportunity not only to keep up with current developments in the Air Force but also to enable them to broaden their general professional military education.

Principal activities of the Extension Course Institute include enrolling students for various phases of the Extension Course Program, distributing course material, grading student solutions to course requirements, maintaining student progress records, plus normal administrative functions. In addition, the Institute is responsible for coordinating the procurement of both new and revised course material.

The Air University Library, located at Maxwell AFB, Montgomery, Ala., provides library service for the Air University and the Department of the Air Force. It also conducts the Air Force historical program; collects, evaluates, and disseminates information of value to the armed forces, as it pertains to nontemperate zones; and conducts a program of research on Eurasia.

The Arctic-Desert-Tropic Information Center collects information relative to arctic, desert, and tropical regions. The information collected is evaluated and then disseminated in the forms of bulletins, manuals and lectures.

Adventure, danger and rough living are frequently experienced by the ADTIC scientists in their search for new information. Recently Paul Nesbitt, ADTIC chief, journeyed by "bongo" or dugout canoe some 800 miles to the headwaters of the Orinoco River in southeastern Venezuela in order to obtain scientific information on an area heretofore unvisited by white men. He was accompanied by Puerto Rican and Venezuelan scientists and 50 Maquiritatre Indians, members of a jungle-dwelling tribe, who served as canoeists, guides and porters. Nesbitt's C-rations were supplemented with cassava, wild turkey, alligator and monkey-meat provided by the Indians who were sharpshooters with the blowgun. Blowgun darts dipped in curare (a strychnos poison) would paralyze these birds and animals within three to five minutes' time and yet, strangely enough, not harm the food for human consumption.

A former member of the ADTIC Dr. George Sutton, had the unenviable experience of riding out a 90-mile gale in a rubber liferaft. Seeking realism in conducting tests of rubber liferafts and exposure suits in Aleutian waters, Sutton and other members of the test team requested that a liferaft be attached to a picket boat by a long line and exposed to the full effect of wind and waves in the open sea. The time picked for the test coincided with one of the worst storms ever experienced in the Aleutians. For 18 hours members of the test team huddled in a covered liferaft which was exposed to wind averaging 90 m.p.h. with gusts well over 100 m.p.h., and to the waves generated by these winds. The test was ended when the observers on the picket boat, who had a searchlight trained on the liferaft, noted that the seams of the liferaft were pulling apart at the point where the rope from the boat was attached.

ADTIC desert specialist Alonzo W. Pond lived for several months on antelope meat while conducting scientific explorations in Asia's greatest desert, the Gobi. On one occasion Pond stood on a high ridge and viewed the valley below. It was teeming with a great number of animals moving down the valley. They looked like sheep and Pond's companion remarked that he'd hate to draw water for them. Pond handed him the field glasses and replied: "Those aren't sheep, they are antelope." The field glasses picked up a solid mass in the valley below—thousands of moving forms, all antelopes—male, female and young. For two miles north and south the narrow valley was filled with antelope. Pond estimated there were 25,000 head. From nowhere else, except Africa, have such large herds of antelope been reported.

The educational system of the Air Force, like that of the other services, culminates in the three Joint Chiefs of Staff colleges. The Armed Forces Staff College, dealing with joint staff and command at theater level, is followed by the Industrial College, which considers the problems of mobilization of the industrial resources of the nation, and the National War College, dealing with highest executive direction of war on a national scale. Air Force officers progress through the Air University system and into these schools selectively.

After only four years of existence, the Air University is a healthy and established institution. An impressive number of officers have completed one or more courses of study in Air University schools. But only by continued effort can the Air University successfully carry out one of the USAF's primary missions—educating an adequate number of officers to maintain, operate, and control the increasingly complex machinery of air power. END

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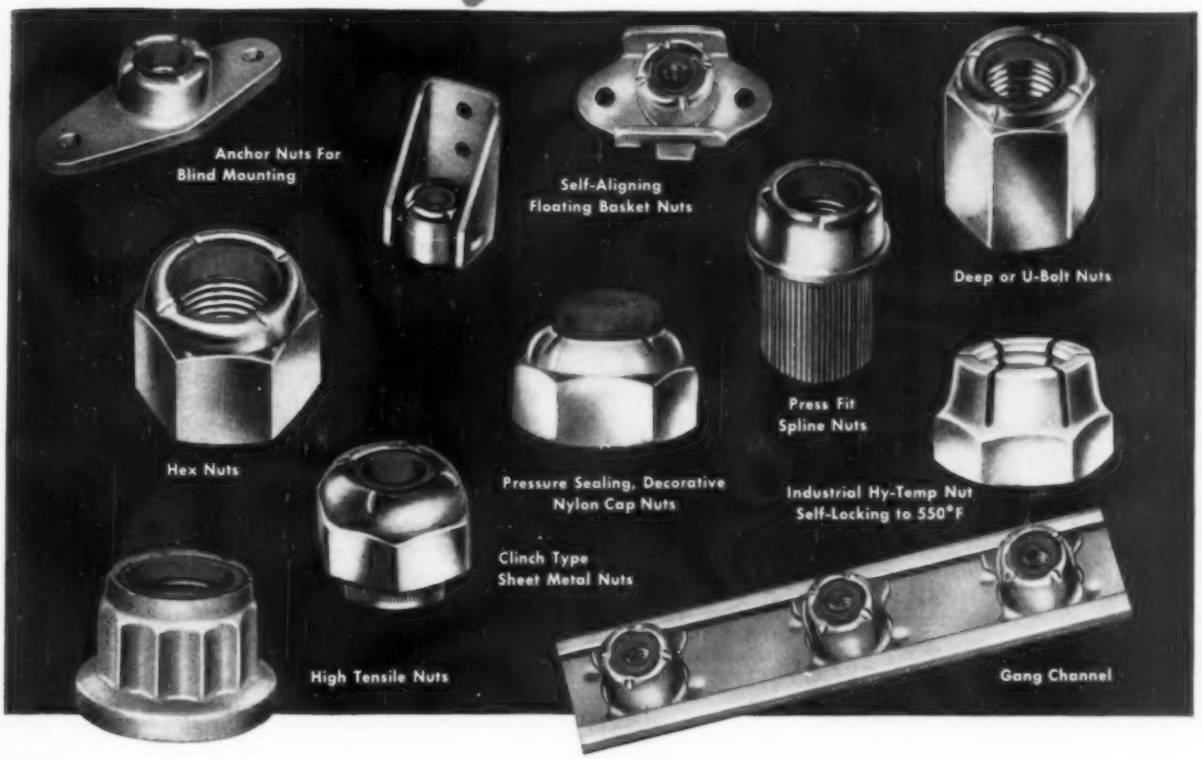
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Materiel

(*Continued from page* 100)

locations with excellent operational facilities may have impossible living conditions. In each case it is necessary to compromise—but compromise requires extensive planning and investigation.

This is a big job, one which can be visualized when you understand that about 11.5 million acres of land are owned and another million leased by the Air Force in the continental United States. The physical plants alone on this vast acreage require about $150 million per year to keep them in repair. The bases require programs to conserve water, electricity, coal, fuel oil and critical materials. They have to be given fire protection and crash rescue services.

And it is always necessary to look to the future. Introduction of jet fighters required longer runways, and the fuel required has multiplied several times since introduction of heavy bombardment aircraft.

Several years ago no one foresaw that the Air Force would need runways capable of bearing loads of 357,000 pounds. But increased weights and tire pressure on modern aircraft require thicker pavements of higher quality materials. The jet engine and its associated fuel spillage, combined with the heat and the force of the blast, have introduced other pavement design problems which are extremely difficult to solve.

● The Directorate of Maintenance, Supply and Services has no counterpart in any commercial business. The present inventory of the Air Force is estimated in the neighborhood of 5.3 billion dollars. That's about 10 times that of the Bethlehem Steel Corporation, one of America's largest commercial corporations, and it doesn't include the value of Air Force planes. The inventory includes over 400,000 items of Air Force property and 200,000 items purchased for the Air Force by the Department of the Army.

Backbone of maintenance and supply is the depot maintenance and supply system, deployed throughout the world. At depot level, civilians overhaul aircraft, engines, accessories, vehicles, ground equipment. They also store, maintain and remove aircraft and vehicles from storage.

Civilians at these depots handle property accountability and control, warehouse operations, publications distribution, local purchase operations and packing and crating. In 1950 these workers handled over three million tons of materiel and processed over 25 million line items.

● The Directorate of Industrial Resources is a product of World War II which showed that wars are fought on production lines as much as in the combat theaters. Unless industry can meet the tremendous demands for air weapons, the largest aviation research and development program is of little value to national security.

The importance of materials to a mobilization program has come a long way from the three materials of steel, copper and aluminum that provided the foundation for the controlled materials plan of World War II. Strategic and critical materials are a limiting factor in mobilization programs and many of these materials are obtained largely from foreign sources and are in limited world supply. The only solution to the problem is to stockpile—and to develop substitutes. Under priorities regulations issued by the National Production Authority, the Air Forces give assistance to contractors in order to acquire materials and components vital to fulfillment of Air Force contracts.

The program of industrial mobilization is vast. There are limited funds for it. And there are too few persons adequately trained for the job. But in spite of these limitations much progress has been made toward the time when the aviation industry's potential is tied into a production plan, guaranteeing enough aircraft to meet mobilization requirements in a minimum time. END

Long Range Proving

(*Continued from page* 94)

the Long Range Proving Ground of the United States Air Force, and the first V-2 ever turned to horizontal flight in this country.

Aside from collection of flight data from the missile, which today have growing significance in the security of the nation, two things happened during those 140 seconds while "Bumper" vapor-trailed away into the southeast.

First, a decision made in 1945 became a reality as the Long Range Proving Ground passed from the planning and preparation to the operational stage. And, second, a guided missile test-flight range potentially 5,000 clear miles long was initiated and brought to the service of this country's guided missiles program.

How important were these two events? The longest instrumented range (with instrument installations for collecting data from missiles in flight) in the country previously had been the 135-mile distance of the combined ranges at Holloman Air Force Base and the Army's White Sands Proving Ground in New Mexico. The Navy's two ranges at Point Mugu and Inyokern, Calif., were also limited to ranges of less than 150 miles and could not economically be lengthened. But the V-2's which the Germans streamed into London during the war had traveled 225 miles at speeds up to 3,400 m.p.h.

A long range was needed, one big enough and equipped so that any missile produced by any of the armed services would have a place to tell its performance story to instrument stations along the route.

The Long Range Proving Ground of the Air Force, a little more than one year after being activated, is rapidly becoming just such a place—a huge land,

sea and air test "laboratory" with a clear flight corridor that can exhaust the range of the most ambitious missile.

Physically, the Long Range Proving Ground (LRPG) consists of a number of dispersed but remarkably integrated parts:

The administrative and functional base at Patrick Air Force Base, Cocoa, Fla.; the launching area on Cape Canaveral; and a string of instrument stations now being established down through the Bahama Islands for the purpose of observing and receiving data from missiles as they pass "down-range."

Taken all together, these installations comprise a testing *service*, and the military and civilian organizations of the LRPG are welded into a single *service* group.

For the LRPG does not build guided missiles. It does not launch armed missiles. It does not fire missiles at tactical targets. It does not arbitrarily pass or flunk a missile on the basis of its performance in flight.

Instead, LRPG tells contractors: "Bring your missile here and test-fly it. We have the set-up you need and our people will give you all the support you need to do the job. We will see to it that the range is safe and, while your missile is in flight, our technicians will gather the information you want and hand you the final results. That's what we're here for."

When originally established, the LRPG was designated the Joint Long Range Proving Ground and was, for a time, operated on a three-legged basis by the Army, Navy and Air Force.

Later, however, the Defense Department delegated sole responsibility for the establishment, maintenance and operation of the range to the Air Force. But the original concept—that the range should be used by all services—has not changed.

Patrick Air Force Base, formerly the Banana River Naval Air Station, is situated about 10 miles off the Florida central east coast mainland on a narrow crust of land which runs virtually the length of the peninsula. The base is the location of the headquarters of the Long Range Proving Ground Division, commanded by Maj. Gen. William L. Richardson, USAF. The LRPG Division is the organizational structure of the entire Proving Ground.

Dr. Arthur H. Warner, an eminent physicist experienced in military research and development, is Director of Technical Operations for the LRPG, the organization responsible for providing all technical services required in flight-testing missiles.

About 18 miles north of the base, on the same strip of off-shore land, Cape Canaveral turns out in a flat, mild promontory. From the point of this Cape for thousands of miles southeastward, beyond the tip of South Africa, no major land mass intervenes.

Down the first portion of this great, empty stretch of ocean extends the missile flight-testing corridor of the Long Range Proving Ground.

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the Banana River, and with only one land trail leading into its interior through swamps and sand dunes, Cape Canaveral has been virtually undisturbed and only sparsely inhabited for centuries, its most imposing landmark being a U. S. Coast Guard lighthouse.

Here, near the tip of the Cape, within some 12,000 acres of scrub-brush solitude purchased by the Government, lies a huge reinforced concrete slab, 100 feet square. This is the launching pad against which "Bumper" spewed its 25 tons of thrust last July.

Adjacent to this launching pad, a similar pad will be laid down. When they are completed, it will be possible to carry on two missile operations at a time without the delay which arises when one missile monopolizes a pad for a length of time. The day is fast approaching when the big, flat pads on the Cape will give footing to as many as 100 missile launchings a year.

"Bumper" took off from what was actually an improvised nest of temporary instrument and launching stations, less than two months after the first shovel of sand had been turned for construction on the Cape. Work now in progress, however, will give rise to a widely scattered stand of permanent buildings.

A massive concrete blockhouse will stand behind the launching pads. This will be the most forward human position during a launching. The building will be linked to the pads by a system of tunnels which now open on the floor of the present launching stage, as will other tunnelways in the pads to be constructed. A cable system running through the tunnels will enable men in the blockhouse to run remote control check-outs of a missile up for discharge only a few minutes before it is to be launched.

And it will be in this blockhouse, as the state of readiness mounts and holds to a kind of tension all down the range, that the smallest yet most effective gesture in the drama of missile launching will occur repeatedly—the closing of the switch which fires the missile.*

The Central Control Station will stand well back within the Cape, flanked at a distance of miles on either side by communication centers. In this building, which must inevitably be called the "brain" of the LRPG, will be the nerve-endings of a vast radio-radar-electronic system which can draw the facilities of the far-flung range about a missile in flight as neatly as a lacing draws a shoe snugly around a foot. Range officers, standing before a plotting board in this central control point, can tell, at any given instant, the location in space, the speed, altitude, and course of a missile blazing away down the ocean range at speeds and distances far beyond the power of the human eye to follow.

For the LRPG will have superhuman "eyes" at sea in the form of instrument stations set up down through the Bahama Islands and beyond, along the course of the flight-test corridor. Each instrument station will be linked into the range by a radio, land wire and submarine cable communication net.

From lift on Canaveral, through flight, to impact in the open sea, a missile on this range is never out of the instrumented vision or control of ground stations. Fans of radar waves emanating from each station overlap in the upper reaches of the range to form a continuous, sensitive path along which a missile in flight traces its own progress as though it were a piece of chalk traveling down an enormous blackboard.

Well in advance of a scheduled launching date, the LRPG determines on what area in the open sea the missile will make impact. A warning is then passed on to all agencies controlling or having knowledge of ship or air traffic in that vicinity.

The limits of range danger are established by two imaginary lines drawn from Cape Canaveral, one running to the northeast and one to the southeast, to form a huge, wedge-shaped area at sea. Some hours before a launching is due, an intensive safety search of this area begins. Ground radar stations sweep the skies for unwarned aircraft. Air Force planes carrying radar equipment search the range for ship traffic. "Polly" planes (equipped with loud speakers) move in when a surface ship is discovered to warn it out of the danger area. In waters just off the launching site, crash boats patrol to ward off small craft that may be passing along the coast into the flight-test corridor. Reports from all these search units flow back continuously to the Range Clearance Officer, the man who must give the word that the range is safe for launching.

In the meantime, on Cape Canaveral, an exhaustive series of checkouts is being completed. The missile with all its parts and instruments has been checked for the final time. All stations in the launching area and down range have reported the readiness of men and instruments. The range is clear. The missile stands alone on the pad as though meditating the distances of sea and sky before it.

Then the Firing Officer closes a switch.

At that instant the missile becomes the sole and absolute responsibility of the In-Flight Safety Officer of the range.

This officer's judgment alone determines whether the missile shall continue in flight or be destroyed for reasons of safety.

As the missile flashes down range, automatic tracking radars connected with a plotting board trace its progress before the eyes of the In-Flight Safety Officer. Reports from sky screens—large frames crisscrossed with an arrangement of wires which outline for observers with powerful telescopes the limits of the range and flight corridor—verify the course of the missile. If, on the basis of this stream of evidence, the In-Flight Safety Officer determines that the missile is behaving erratically or approaching the "destruct" lines — predetermined limits drawn within the danger area — he can instantly order the missile destroyed in air. A radio signal from the "destruct" station can either cut off the missile's fuel supply or explode "destructor" charges within its hull. "Bumper" was destroyed as a test of this safety system.

Probably few people ever have less time to make a decision—or better evidence to base one on—than the In-Flight Safety Officer of the LRPG watching a missile blister down-range, making miles seem like inches.

In the winter of 1944, when the Germans began pouring "buzz-bombs" toward the key supply port of Antwerp, Maj. Gen. (then Brig. Gen.) William L. Richardson was in command of the Ninth Air Defense Command, charged with the aerial defense of important areas behind the U. S. front. His command destroyed more than 2,000 in-coming "buzz-bombs" during the bitter, long-range fight for Antwerp. Only 211 German missiles struck through to the vital port. From those days of defense against a guided missile attack to the present period of missile test-flights at the LRPG, General Richardson's position in the missile field has been one of pioneering leadership.

He headed the Committee on the Long Range Proving Ground which undertook studies and surveys and, in June, 1947, unanimously recommended that the launching area be located at Cape Canaveral, Fla.

The isolation of the Cape presented natural safety and security features. The weather in the area made possible a year-round launching schedule. The availability of the nearby Banana River Naval Air Station as a ready-made operations base represented a saving of approximately 20 million dollars in initial expense. In October, 1949, the LRPG was activated at its present location.

A bill authorizing the establishment of the Proving Ground had been passed by Congress and signed by the President in May, 1949. An agreement with the Bahamian Government and Great Britain concerning the building of "down-range" bases had already been reached in February of that year. General Richardson assumed command of the LRPG, which now has major air command status, in April, 1950.

The history of the LRPG—the process of vision, study, decision, legislation, agreement, organization, building—today sharpens down to that fine point in time which, on Cape Canaveral, is X-firing time. And as that second approaches, with its seeming power to combine all elements of nature into a waiting silence, the missile on the pad assumes the proportions of an overpowering actor on a stage, awaiting the cue for a dramatic exit.

When the day comes that guided missiles are needed to play their parts, to speak strong lines in the defense of the nation, their performances will stem from experimentation and testing at the Long Range Proving Ground of the United States Air Force. END

* (It should be understood that what is now being described is the permanent shell which will be raised over present LRPG operations. While full strength testing activity must wait the completion of Proving Ground installations, the LRPG is now, and has been for the past several months, conducting missile flight-tests on a limited scale. Several missiles of a secret type have been flight-tested here since the launching of "Bumper").

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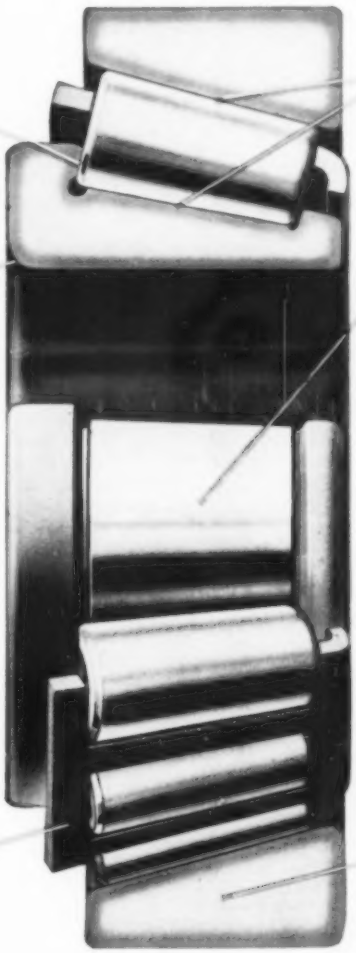

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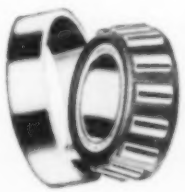

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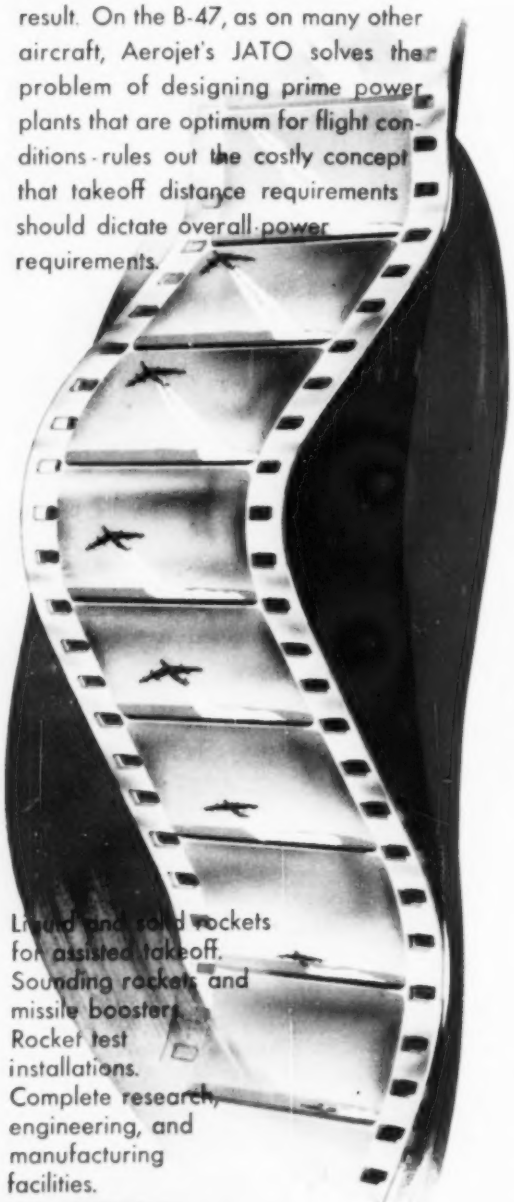

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Alaskan Air Command

(*Continued from page 52*)

was not a single Air Force unit in Alaska. A mapping and surveying party, led by the late Gen. H. H. "Hap" Arnold, explored the country in 1934. But it wasn't until August 1, 1940, that the first cadre, one officer and two enlisted men, set up headquarters at Merrill Field while bulldozers broke the frozen ground to build Elmendorf AFB.

Since World War II the defending forces of Alaska have been strengthened considerably. The Alaskan Command—a joint organization of the Army, Navy and Air Force—has been established to control all activities.

The Alaskan Air Command functions as part of the theater command, building a tailor-made air defense for the frozen land and testing new equipment under Arctic conditions.

Pilots have to be specially trained to fly in Alaska. Before a new pilot starts to fly with a squadron he has to earn an Alaskan instrument card in addition to any other he holds. He also must have a route check before he can fly as first pilot on a cross-country. This involves landing with a check pilot at each station on the route, and an extensive written exam on Arctic flying procedure and weather.

Another important special activity of AAC is the survival training school run by the 5001st Survival Squadron. Men who serve in the Arctic have a natural fear of flying over the rugged ice-bound terrain, primarily because they are ignorant of survival methods in such extreme cold.

The 5001st puts each man in Alaskan service through a program in which he learns to use survival equipment. This includes several days of actual living in a snow hut or parachute tent in weather of 40° to 50° below.

Since there is always the possibility of having untrained personnel aboard a downed airplane, students at the survival training school learn how to organize survivors into an efficient team, how to distribute equally the work-load of building a camp, and how to minimize anxiety through self-help.

Connected with the Alaskan Air Command is the 10th Air Rescue Squadron, which is especially geared to Arctic requirements. First priority is given to military emergencies, but the squadron's civilian missions number into hundreds. Typical of these was one that occurred before Christmas in 1948.

The rescue squadron was notified by the CAA that a civilian airliner bound for Anchorage was forced down by weather on a small lake on Point Possession, about 20 miles from Elmendorf AFB. Among the airliner's passengers was an expectant mother who was due at the hospital soon. A check on the weather showed that the winds were reaching 70 knots and heavy snow was falling. But Rescue sent a helicopter with a flight surgeon aboard to take care of the woman.

During the flight, however, the pilot reported that the turbulence and high winds had blown the nose glass out of his helicopter. He was doubtful whether the return trip should be made with the helicopter in that condition.

The 10th then dispatched a small aircraft (*Norseman*) equipped with skis, to the rescue scene and a landing was successfully made. The patient was loaded on the plane and the *Norseman* took off for Anchorage. But it was unable to get through because of the weather and had to return to the lake.

The pilot of the *Norseman* radioed the base that the party would remain overnight on the lake. A makeshift bed was rigged for the expectant mother in the fuselage of the plane.

The next morning the gale still continued, and the wind had blown the *Norseman* into the trees and damaged the wing and propeller. Another helicopter was dispatched from Elmendorf but was unable to reach the lake because of excessive turbulence.

But a few minutes later the patient was loaded on board the damaged helicopter, which slowly flew 10 feet off the ground to Anchorage, with little time to spare in getting the expectant mother to the hospital. The rescue crew was jubilant over the success of the mission and nicknamed the little girl "Stormy." Later the squadron presented the child's mother with a narrative account of the mission to be given the child when she was grown.

It is under conditions like this that the whole Alaskan Air Command functions to guard our northern border. END

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Strategic Air Command

(*Continued from page* 39)

In aerial warfare between great nations, attack is the peculiar function of the strategic bomber. It alone can deliver blows upon the heartland of an enemy nation—devastating blows of atomic power delivered upon the industrial complexes of that nation, upon its stockpiles of war materiel, upon its interior communications system, and upon the life of its citizens.

The Strategic Air Command is that part of the U. S. Air Force charged with the responsibility for conducting strategic air warfare against any enemy of the United States. In a true sense the SAC is not in itself nor in its underlying political philosophy a force for war. On the contrary, it is a force at present employed solely in a great effort to preserve world peace.

As a historical parallel it should be pointed out that during the longest period of peace on the European continent in recent times—that between 1870 and 1914—it was largely England's Royal Navy that helped to preserve the peace of the world solely because it was a powerful force *in being*—a force that nations with possibly aggressive intentions felt assured would be used against them if they should initiate a war.

Today, the dominant mantle that sea power has worn in the past has been donned by air power. With the advent of atomic fission, the power to destroy has been given a reach so long that it can rain blows upon the remotest corners of the largest and most geographically secluded nation in the world. Where navies cannot reach, where armies could not penetrate, air power can carry the blows that, sooner or later, must destroy the nation having lesser air power.

Near Omaha, Neb., is an Air Force Base named Offutt—after an airman of the U. S. Air Force who gave his life for his country. Here, the Strategic Air Command of the U. S. Air Force assumes its grave responsibilities.

Here SAC's commander Lieut. Gen. Curtis LeMay formulates his plans and directs with his forceful personality the staff of officers who control and fly the biggest, most powerful, and fastest bombers the world so far has seen.

From this headquarters base General LeMay directs the operations of his three air forces: In the central United States is based the 8th Air Force with headquarters at Fort Worth, Tex. In the South, the 2nd Air Force has its home, with headquarters at Shreveport, La. On the West Coast, at Riverside, Calif., the 15th Air Force maintains its headquarters. In addition to these places, SAC bases are located on the West Coast and across the southern United States.

Each of these three air forces has its own reconnaissance units, tanker units, and cargo units which enables it to operate independently in any part of the globe to which it may be assigned. In addition to these supporting units, the 8th and 2nd Air Forces also have fighter-escort wings.

The reconnaissance units serve as the eyes of the bombers: they go and see the targets first and photograph them before and after a raid to see what should be hit and how well it has been hit. The tankers provide long-range assistance to the medium bombers by refueling them in the air.

The nearly unlimited flexibility that is provided by air-refueling was illustrated by the non-stop around-the-world flight of a SAC B-50 bomber in March, 1949. The *Lucky Lady II* was refueled four times on its historic eastward flight. Unofficially it was estimated that the bomber covered more than 23,000 miles, refueling over the Azores, Saudi Arabia, the Philippines and Hawaii before landing back at Carswell AFB, Fort Worth, Tex., after an elapsed time of 94 hours in the air.

The cargo units of the SAC air forces are used to augment the airlift provided by MATS (Military Air Transport Service) to move the personnel, supplies, and spares that will be required by the medium bombers when they move to advanced bases.

At present the basic weapons of all three air forces are the medium bombers—the B-29's and the B-50's. The wartime-produced B-29's are currently being modified to increase their combat capability. The greatest increase in their combat capability is not, however, any-

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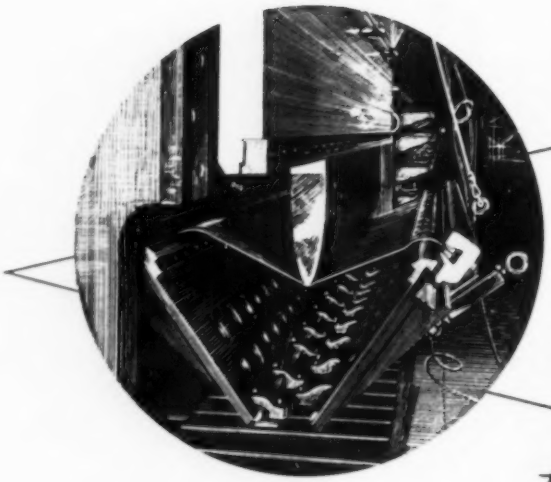

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thing that it built into the bombers themselves. It is the modern and scientific adaptation of in-flight refueling, which does for the older bombers what no amount of modification possibly could do: it increases their range enormously.

Ultimately, it is planned to replace both B-29 and B-50 medium bombers with newer aircraft of much greater combat potential. When all mediums have been replaced by such aircraft as the jet B-47 and the intercontinental B-36, the overall combat capability of SAC will be increased enormously.

SAC's 8th Air Force has units equipped with B-36's and it is contemplated that other B-36 wings will be activated in the near future. When B-47 jet bombers are ready for operational use they also will be assigned to SAC units.

The most effective operational bomber at present is the 10-engined inter-continental B-36, a plane with more than 40,000 horsepower in its six conventional and four jet engines. Capable of operation well above 45,000 feet, it can carry a bomb load of 10 tons for a distance of 5,000 miles and return to its base. Pressurized for extreme altitudes, the B-36 has more powerful armament and better fire control systems than any previous American bomber.

The B-36 is the first airplane ever built capable of operating against targets on the continents of Asia and Europe from bases in the United States—and without resorting to in-flight refueling.

In addition to these bombers, SAC also operates jet F-84E and F-86 escort fighters, jet RB-45 reconnaissance aircraft, C-97 and C-124 transports and various types of administrative aircraft.

It must be realized that the Strategic Air Command is not as yet, with the exception of B-36 units, a truly intercontinental bombardment force. It will not become so until medium bombardment aircraft have been replaced with longer ranged more modern bombers.

It will be some time before B-29's and B-50's will be replaced and it is necessary to depend on them should war come in the near future.

In order to overcome most of the problems anticipated in the uses of medium bomber operations in a global war, a mobility plan has been devised. This plan provides for moving air forces equipped with medium bombers to places around the globe from which they may maintain combat operations within range of an enemy nation.

All training operations are conducted as nearly as possible in the same manner SAC plans to conduct combat operations. A training mission in a medium bomber may last up to 20 hours—or longer if air refueling is involved. A heavy bomber may stay in the air for nearly two days.

During the course of a training mission, the bomber may search out as many as half a dozen selected practice targets. As each target is approached, electronic devices record data on the plane's course, its altitude and its speed. When the bombardier signals bombs away, an electronic recorder indicates exactly where the bombs would have fallen in the target area. In SAC, continual stress is placed upon both navigational and bombing accuracy.

All aircraft are equipped to bomb under either visual or instrument conditions. Present day instrument bombing accuracy is from four to five times better than it was in World War II. This is due in great measure to the fact that crews have worked together, in many instances, for several years. With them, precision teamwork is almost automatic. Furthermore, bombing equipment has improved considerably since World War II. Each man in a combat-ready SAC crew not only must be an expert in his field but also must be willing to work as part of a team. The average SAC combat crew feels that some day the victory of the United States in war may depend upon their everyday performance in peacetime.

SAC commanders are primarily concerned with the combat capability of their units. Over-all combat capability is determined by many factors, such as degree of crew training and supply. But the most important factor affecting combat capability is the in-commission status of aircraft. SAC bombers usually are heavily loaded and operate at extreme altitudes. This requires the more or less constant use of high power settings which increases engine maintenance and replacement problems. The large amount

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of complicated electronic, radio and other special equipment is an additional burden to SAC's skilled maintenance technicians.

The essence of the SAC plan is to have the four basic requirements to do its job all in position and ready for use at any time. These four requirements are: personnel, supplies, equipment, and facilities. They must be so placed that they are kept in a constant state of readiness to move to advance bases.

Careful study has shown which aircraft and engine parts may be expected to wear out quickly. Spare parts in sufficient numbers for 30 days of combat operations have been packed in special aluminum bins designed to hang from shackles in the bomb bays of B-29's and B-50's. They are always ready to go. Complete spare engines are carried in cradles designed to fit into a bomb bay. Both replacement kits and spare engines are assembled and maintained in a state of constant readiness at the various bomber bases.

The Military Air Transport Service assisted by limited transport facilities within SAC must move the balance, and do it within a few hours of the departure of the combat aircraft.

Key personnel such as the mechanics, supply men, radar technicians, armorers, radio experts and many others are assigned by name to a definite aircraft aboard which they will depart when the unit gets orders to move.

So complex is the equipment, so many and so varied are the special skills required to maintain it in perfect operational condition, that the technical maintenance personnel are as necessary to the functioning of the aircraft as are gasoline and oil. Great care is devoted to the selection of exceptionally capable airplane commanders and to the intensive training of the individual combat crews.

Although SAC has the bulk of the nation's striking air power, it has only about five per cent of the total personnel of the Armed Forces of the United States and roughly 16 per cent of the personnel of the Air Force. Last year, SAC's operating costs of $300,000,000 exclusive of the cost of new aircraft, new construction and other items of capital cost, were only 2.3 per cent of the entire Department of Defense military budget. That is a cost of $2 to every citizen in our nation of 150 million people.

With the atomic bomb as its most powerful weapon, strategic bombing has become the most powerful force for destruction the world has ever known in its turbulent history.

SAC has been designed, trained and equipped to paralyze economic systems by delivering concentrated nation-wide attacks simultaneously against industrial complexes, centers of government and authority, communications centers, sources of power and stockpiles of strategic materials.

A successful air attack against an enemy can reduce these vital centers so that they can no longer function or support the military. The enemy is deprived of his means of war, and the morale of

the civilian population is weakened.

The Strategic Air Command is the atomic fist of the free world. It is the only weapon which can reduce the basic national industrial and social systems of an enemy to rubble and chaos.

Deprived of our Strategic Air Command and adequate air defense, the fate of the United States would not be in doubt for long. It would join the nations of the past that have travelled from world leadership to destruction. END

WAF

(*Continued from page* 99)

and telephone operators. Now almost all of the 42 career fields in the Air Force are open to women—many of them in the most technical phases of aviation.

Thousands of WAF's hold jobs as parachute riggers, model-trainer instructors, plane dispatchers, cryptographers, radio mechanics, photographers, traffic analysts, medical technicians—and many others.

Women enlisting in the Air Force must be U. S. citizens between 18 and 34 years of age, high school graduates, and unmarried at the time of enlistment. Enlistment periods are for four, five or six years.

There are several exceptions to these rules. Women over 35 who were members of the WAC, AUS, after July 1, 1943, may enlist if their service equals or exceeds the number of years they are past 35. Married women who have had prior service may re-enlist if they have no children. Girls between 18 and 21 years must have their parents' consent before enlisting.

Eligibility for Officer's Candidate School is determined by age, education, health, character, and vacancies in the school and officers' ranks. An OCS candidate must be between the ages of $20\frac{1}{2}$ and $26\frac{1}{2}$ years. She must have had two years of college, unless she is already an enlisted WAF. In that case, if she passes the aviation cadet OCS examination, with a satisfactory grade, the education requirement can be waived.

Both OCS and technical school training is co-educational and it has been found that the keen competition between men and women for the same jobs and promotions has resulted in an over-all rise in grade averages.

There is a good reason for this realistic personnel policy. World War II taught the serious lesson that our manpower reserves are limited to the point of danger in a national emergency. Since women constitute 52 per cent of the nation's population, it is only logical to plan to utilize them.

Before the recent emergency, the maximum proportion of WAF's was about two per cent of total Air Force strength. A rise to 10 per cent is now under consideration. END

Comptroller

(*Continued from page* 117)

of the report will be left on the officer's desk.

Then, nothing happens.

But sooner or later comes a routine request for information or a demand for a picture of a critical situation. Report in hand the numbers man goes back to the officer and suggests that the table on page six gives the needed information.

The usual response is, "Why the hell don't I get this report?" The reports engineer refrains from telling the officer that it was especially designed for his use, that he was briefed on the first issue and that it has been coming to his desk for five months.

The reports engineer seizes the opportunity to display the full contents of the report. From now on the officer will welcome return visits and make recommendations for improving the report.

The reports engineer has turned the last necessary trick of his trade—getting his numbers used. The top-side officer who feels that he has designed a report tailored to his needs will use it.

Several years of designing and testing have yielded a small control panel of statistical instruments that has its place on the desk of each member of the top staff in the Pentagon and on the desk of each major field commander. This small report displays 23 indicators. The top command has come to feel that as long as these 23 indicators stay out of the red zones, the Air Force is gaining altitude.

The Air Force knows that good management is founded on rigid discipline and that close to the core of management is the art of ruthless self-evaluation. The reports and other tools of modern management used in today's Air Force are as cold and impersonal as the meters on the pilot's instrument panel. They throw a relentless light on human failures and shortcomings. But they must be used to master the immense problems of today's large-scale, technological operations.

Airmen have long been aware of the absolute necessity for good management of their show. The Air Command established the first military comptroller as a member of its top staff and gave him the same general responsibilities that his business counterpart has. Today each sub-command and combat wing has its comptroller's office. The pattern set by the Air Force materially influenced the recent amendments to the National Security Act which established comptrollers in the Department of Defense and the three armed services.

Initially, any air officers who had grown up flying by the seats of their pants disliked this emphasis on numbers and paper work. But it didn't take long to demonstrate that the detested paperwork actually was getting appreciably more Air Force for the dollar spent. And show a flyer how to get more Air Force and he will do almost anything—even a little more paper-work. END

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Air Materiel Command

(*Continued from page* 91)

the Air Materiel Command does—some of its activities, aims, accomplishments:

PROPELLERS. The conventional propeller facilities at Wright Field may be gone but propellers have a new look today. Paradoxically, the propeller laboratory is just about the busiest place on the whole reservation. One of the pioneer propeller experts says: "Aerodynamically, there is every promise of having in a few years propeller-driven airplanes capable of speeds of 1,000 m.p.h. There are supersonic propeller designs which make that day seem not too far distant." But a big problem lies in making such props strong enough.

Elsewhere in the propeller labs such features as articulated retention systems, hollow aluminum blades, very wide blades and hot-air de-icing are being investigated.

HELICOPTERS. Virtually overnight two huge helicopter rotor test stands have sprung up. When completed they will be the largest in existence. There is a new helicopter shops building which will be devoted entirely to fabricating new type rotor blades.

ARMAMENT. Men in the big Armament Lab did the planning and modification program on one of the jet bombers to make it an atom-bomb carrier. Four new gun ranges point to the fact that for some time to come airplanes are going to be using guns for firepower—though possibly of heavier caliber. And there is new emphasis on rocket launchers—even for bombers. The development of guns, rockets and bombing systems have all been entrusted to the AMC.

AIRCRAFT DEVELOPMENT. The Aircraft Laboratory is responsible for the research and development of airframes and their integral components. Two new supersonic wind tunnels have been built. One specialist predicts: "With some of the power coming along we don't for sure know what shape some of tomorrow's designs may take. They may be built like boiler-plate construction. And there doesn't seem to be any limit on size. We can build planes as big as ocean liners now."

There's an investigation underway for an unusual method of landing and taking off. Planes without undercarriages may come in wide use. They ride a rocket sled which roars along a monorail, then literally "kick" the plane into the air. When the plane wants to land it comes down on skids.

There are new ideas on plane shapes, wing angles, and stress. Scale models undergo wind tunnel tests.

AIRCRAFT TESTING. Before a new plane can be accepted by the Air Force it must prove itself in punishing static tests in the Aircraft Laboratory—and in the air by the Flight Test Division. The Division test-flies all experimental and production type aircraft to evaluate their performance, stability and control characteristics. Equally important is the testing of new component aircraft parts. The Flight Test Division tests laboratory-developed pieces of equipment like the pilot ejection seat, tractor-type landing gear, and such personal equipment as flying suits, parachutes, G-suits and oxygen masks.

During 1950 the Flight Test Division tested such big cargo carriers as the C-123, C-124, and C-125; the new jet bomber, the XB-51; the XF-90 and XF-91, and two new helicopters, the H-12 and H-19. A tractor-type landing gear in place of conventional wheels was tested on the B-36. It was the same sort of gear previously tested on the C-47 and C-82 but this was the trial run for a very heavy bomber.

AIR MEDICINE. The Aero Medical Laboratory at Wright Field is concerned with men instead of materials—with the effect of flight on the human body instead of flight itself. The laboratory studies the behavior of the human body under the punishment of high altitude, extreme speed, lack of oxygen, G-force, intense cold, and so forth. Some of the important physical and medical safeguards coming out of the Aero Medical test chambers are:

- G-suits.
- New type oxygen masks.
- In-flight food warming ovens and new rations that can produce hot and tasty pre-cooked canned or frozen meals in a matter of minutes.
- A strong, light-weight seat that faces the rear of the plane and can withstand forces almost three times as great as its front-facing predecessors.
- Protective clothing, a coverall and hood assembly of vinyl-impregnated Fiberglas, butyl rubber boots and vinyl-coated cotton gloves that are worn by personnel handling liquid rocket propellants. To avoid overheating, an outer shell of mercerized cotton is fitted over the protective coverall and saturated with water. The evaporation helps cool the wearer.
- For Arctic survival, a "Walking PX" is a new sustenance kit that attaches to the airman's back-style parachute and does double duty as a seat for the pilot while he is in flight. Among 22 items in the kit is a vacuum-packed sleeping bag that will keep its occupant warm even in temperatures of −40°.
- New spherical visor that virtually glues a crash helmet to a flyer's head in bailouts of more than 500 m.p.h. No previous protective helmet would remain on in bailouts that approached 400 m.p.h.

EQUIPMENT LABORATORY. Hundreds of projects are underway here. They include new automatic pilots, remote control systems for aircraft and missiles, new types of parachutes, training equipment and synthetic trainers, aircraft electrical systems, runway lighting equipment, special ground power units, aircraft heating and cooling systems, and scores of others.

A new parachute with a built-in brain knows when and where to open in high-speed, high-altitude bail-outs. When the pilot bails out he pulls a handle connected by a cable to an automatic release. Then the pre-set release takes over and opens the chute after the airman has fallen to a safe altitude. Using this parachute, Capt. Vincent Mazza recently set a new altitude jump record of 42,176 feet.

The Equipment Laboratory has environmental testing facilities that can simulate and even exceed all the climatic conditions of earth or atmosphere known to man.

The lab has also developed a tractor weighing 29,000 pounds whose sole job is to haul the huge B-36 around on the ground. It can pull a plane weighing as much as 400,000 pounds—more than the gross weight of the B-36—and is so maneuverable it can make a complete turn in an area less than 17 feet across. It can even move sidewise!

GUIDED MISSILES. The Aircraft and Guided Missile Section has received new impetus at Wright Field. They don't build supersonic guided missiles there but AMC men work out the designs, powerplants and controls. Nearly every laboratory on the field has some role in this program. "You might say," said one expert, "that right here at Wright Field we are steering the guided missile program so far as the Air Force is concerned."

ELECTRONICS. What was once just a single laboratory, the Aircraft Radio Lab, has been elevated to the importance of a subdivision. Today it is the Electronics Subdivision. There are three laboratories under it plus the important Watson Labs and Cambridge Research Labs. The AMC is concerned with five "systems" programs: communication, navigation, aids to air defense, countermeasures and guidance and control, and three supporting programs. Objectives range from pure research to developing 60-ton detection radars.

The Communication and Navigation Laboratory has developed a new emergency keyer that will help Air Force planes in distress send out a chain of automatic distress signals. The pilot only flips a switch and the unit automatically retunes the aircraft's radio transmitter to the emergency channel and transmits the plane's identification or call plus a series of SOS's that will aid ground direction equipment to establish an approximate location. The sequence is repeated until the unit is turned off or made inoperable.

Typical program is an experiment conducted with television in aircraft. A B-17, for instance, has been flying around the skies without anyone aboard. In the cockpit where the pilots should be is a unique television camera arrangement. It transmits pictures of the instrument panel back to an operator on the ground who "flies" the plane by remote control.

If the missile is ever developed that will go from Omaha to Omsk simply by pushing a button, the electronic experts at Wright Field will undoubtedly be responsible for its "magic brain." END

●A famous general of the U.S. armed services recently said, "When an airplane is sitting on the ground, it's going to waste."

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Chaplains

(*Continued from page* 123)

religion, morale, and morals, and are members of character guidance councils.

An example of one of the morale-building services of the chaplains is the air-drop to men at isolated Arctic stations in Greenland, Labrador and Newfoundland. Shortly before the holidays each year a plane flies over these bases and drops a load of gifts and Christmas messages. Chaplain Glenn F. Teska who helped with the 1950 "Operation Christmas Drop," said, "Some of those boys have had virtually no contact with the outside world for a year, and they sure like to be remembered at Christmas. It was quite a sight to watch the men race toward the gifts. Some were on dog sleds, some drove caterpillars and others floundered through the snow on foot."

Many chaplains fought as combat personnel in World War II. Typical of these is Chaplain (Lieut.) Paul A. Trump, on duty at Sheppard Air Force Base, Tex. Chaplain Trump was a wartime navigator on a B-29. Shot down over Japan, he spent months as a prisoner of war. When the war ended he entered a seminary, completed his studies, and returned to the Air Force in this new capacity.

The Chief of Air Force Chaplains is Maj. Gen. Charles I. Carpenter. He acts as adviser to the Chief of Staff on matters pertaining to religion and moral welfare of the Air Force.

It is his business to see that bases in the United States and overseas are properly manned by chaplains in accordance with denominational quotas. He solicits civilian church bodies for clergymen to accept duty as chaplains. He also sees that chaplains receive the proper technical training necessary for service in the military and that they are furnished the necessary equipment.

He has as an assistant, a deputy chief with the rank of brigadier general; an administrative executive, and staff sections that include a personnel division and a plans and training division. Since great emphasis is placed upon maintaining a high standard of spirituality within the chaplaincy, a professional branch has been established as part of his office.

Also within the framework of this office is the Casualty Assistance Branch which gives practical aid to families that have suffered loss through death.

Constant contact is maintained between the chief's office and base chaplains, as well as with intermediate commands. At all levels the program has one purpose: to be of maximum assistance to everyone in the Air Force.

Since the outbreak of the Korean War, chaplains have accompanied combat units. Services are held even at advanced airstrips, sometimes in bullet-riddled hangars.

Recently a new activity—operation "Orphan Annie"—was added to the job chaplains are doing in Korea. Chaplains established a refuge for Korean war orphans and when it became untenable they organized an airlift to carry the children to safety. END

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Today, the Air Force once more is availing itself of the know-how of private aviation's finest service facility. This tapping of civilian experience —this evidence of the official Air Force conviction that the best is none too good for its men who fly—is typically USA, and we're proud to have a hand in it!

We're proud, too, that at the same time we continue to be executive flying's biggest, and busiest, maintenance headquarters.

Military Air Transport

(Continued from page 116)

vast air transportation system but also provides the indispensable global services of the Airways and Air Communications Service, Air Weather Service, Air Rescue Service and Flight Service. Without these highly professional and experienced services, air traffic volume, safety and dependability would be impossible.

AIRWAYS AND AIR COMMUNICATIONS SERVICE (AACS) is a world-wide system of communications and navigational aids created for the safe movement of aircraft. Most of its work is directly or indirectly for the benefit of pilots. It supplies the Air Force (and at times others) with a system of signals for flyers. It uses everything from "biscuit guns" (signal lamps) to the latest radar devices in carrying out its mission. Its messages must move quickly to cope with jet speeds. AACS does a specialized signal job tailored for military flying.

AACS is everywhere the Air Force is and produces 19 different kinds of communications and navigational services. To accomplish this, it has 15,000 officers and airmen thinly strung out almost around the world. Slightly more than half of them are overseas. On the scene of any Air Force flying activity, AACS arrives early and leaves late. Korea is a typical example. Almost at the outset of hostilities AACS airlifted 320 signal specialists to the scene to provide the necessary services to back air action in Korea.

THE AIR WEATHER SERVICE (AWS) assumes one big responsibility of MATS—that of providing a global meteorological service for all components of the Army and Air Force operations. AWS has 9,100 personnel posted at nearly 200 installations throughout the northern hemisphere.

Six aerial weather reconnaissance squadrons operating from Japan, Guam, Alaska, California and Bermuda collect weather data from over 2,500 nautical miles of remote land and sea areas beyond the range of ground stations. In hurricane and typhoon seasons, WB-29's track tropical storms for timely storm warning service for the military and civilian population in the path of these storms. In Alaska, the AWS "Ptarmigan" flight has been flying over the North Pole every other day and had made approximately 400 flights over the Pole to January this year.

A sidelight of the North Pole "Ptarmigan" weather flights in 1950 was the discovery by AWS pilots and observers of three floating ice islands in the Arctic Sea. These islands, with a total area of several hundred square miles, may offer future bases for weather observation and geophysical research activity in the far north.

The information provided by AWS is transmitted by AACS around the world. The work of these two MATS units is closely entwined to provide dependable and rapid information for aerial traffic around the world. In remote outposts from the Arctic to Pacific atolls and desert outposts, AACS and AWS personnel work side-by-side to collect and transmit vital weather information.

One of the most dramatic operations in the MATS family of services is the day-to-day humanitarian operation of AIR RESCUE SERVICE which has demonstrated in Korea the truth of the Service's motto: "That Others May Live." The Third Air Rescue Squadron operating in Korea is only one of 10 such squadrons strategically located around the globe on a 24-hour, seven-day-week standby alert. From the start of the Korean conflict until the end of December the Third Air Rescue Squadron is credited directly or indirectly with saving the lives of more than 750 United Nations personnel.

In the hands of the Third Air Rescue Squadron pilots, the helicopter has come into its own as an indispensable, humanitarian tool of modern warfare. Helicopter pilots in Korea have been operating at and beyond the front lines. They evacuate critically wounded ground troops to rear hospitals. They operate under fighter escort more than 100 miles beyond the firing line to rescue pilots in mercy missions. They have lifted medical supplies including blood plasma to the front lines.

The Third Air Rescue Squadron was the first to operate helicopters under enemy fire. The first blood transfusion in helicopters during flight was performed during its operations, and it has the dubious distinction of being credited with the first helicopter downed by enemy action and the first helicopter forced down in enemy territory.

Another one of the MATS family members, the only one that operates only within the continental limits of the United States, is FLIGHT SERVICE. Its basic function is to make military flying safer. From its nine operational centers throughout the United States, flight advisory and flight monitoring services are relayed to aircraft on request. Flight Service watches the military aircraft in flight so that immediate search can be started if an airplane is overdue at destination. Flight Service facilities are used by the Navy, Coast Guard, Army and Marine Corps as well as by the Air Force.

In addition to its operational services, MATS, as the air transport agency of the Air Force, is the adviser to the Chief of Staff, USAF and the Department of Defense on the utilization of our vast civil air transport reservoir of planes, personnel and over-all centers and is charged with the responsibility for the most efficient utilization of the capacity of the civil air carriers in time of emergency. For instance, the smooth integration of civil air carriers into the Pacific Airlift was an example of the careful day-to-day planning and close liaison maintained by MATS with our civil air transportation industry.

MATS combines military air transport resources into a world-wide system with unified training, equipment, techniques and procedures. Wrapped up in one package, MATS makes available a strategic air transport force ready and able to back up American forces wherever they may be required to operate. END

Air Proving Ground

(Continued from page 97)

plane without ever seeing his target! Again the Air Proving Ground and its staff of experts had performed in practice what had been worked out in theory.

Some 10,000 men are gathered together in an isolated corner of northwest Florida on the 500,000 acres of Eglin, the largest military reservation in the country. To the Air Force, Eglin is a combination handmaiden, nurse and court adviser. Most of the new equipment the Air Force is considering comes here at an early age. Here, a dozen clusters of technicians, mechanics, pilots and observers are turned loose on it. The new jet—or greasegun—may look very nice. It may handle like a 1951 Cadillac. It may photograph well in newsreels. But can it do its job? And, if it can, how should it be used to gain the best effect?

Under realistic simulated combat conditions the men and pilots of Eglin test equipment ranging from clothing for stratosphere flying to the giant B-36. Upon their findings wait the assembly lines of the country. If the so-called "operational suitability" tests at Eglin show a bomber to be incapable of performing well in modern combat the bomber is not mass-produced and the designer goes back to his drawing board.

Once a plane shows it can do a specific job in the Air Force, the tests move into their second phase. Combat tactics tailored to the characteristics of the aircraft must be developed. The most famous example of the Eglin-originated tactics is the Doolittle raid on Tokyo in the spring of 1942. In March of that year, Lieut. Col. James Doolittle and a group of 72 pilots and 75 enlisted men isolated themselves at an outlying airfield. There they worked out details of the attack which was to surprise the Japanese Empire and astonish the world.

Under the direction of Maj. Gen. Bryant L. Boatner, the Air Proving Ground now is operating to meet the demands of an Air Force suddenly faced with the problem of expansion. The only evidence General Boatner shows of the pressures upon him is the coffee cup constantly by his side. A chain-coffee-drinker, he often consumes a dozen cups a day.

An example of the men who fly the test planes is barrel-chested Capt. Alexander J. Kisselburgh, Jr., a B-36 pilot whose flights connect Florida with Alaska and Hawaii. A 10-engined pilot, Captain Kisselburgh is one of the few flyers in the country who doesn't look completely lost beside the bomber. There is a rumor that he is to have a pair of foot-long wings which will make the regulation pair look like a fraternity pin.

The showpiece of the Air Proving Ground is the versatile climatic hangar, which is large enough to hold a B-36. Once inside this weather factory, a plane can be subjected to almost any temperature condition. Within a matter of days, Air Force technicians can lower the structure's temperature to −65° and then raise it to 165°.

A plane has to stand and suffer, but

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Since its introduction six years ago, Time-Rite has proved to be the fastest and most accurate tool ever designed for precision timing of aircraft engines. Immediate acceptance and continued use by the U. S. Army and Navy Air Forces as well as all major airlines, engine manufacturers and individual operators is conclusive proof that Time-Rite is universally accepted as the "Standard Timing Tool for Aircraft engines".

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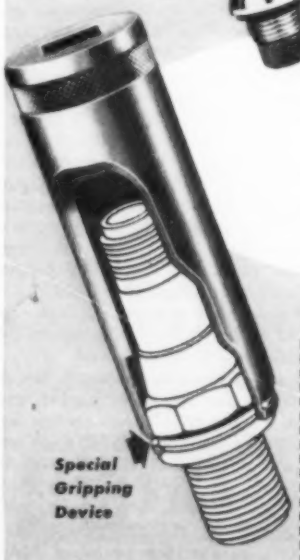

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not everything is so obedient. Last fall an Army mule being tested in the hangar decided that things had gone far enough and took off, trailing a growing string of Air Policemen and swearing mechanics. Up and down the streets of Eglin the mule cavorted until he was captured in front of Johnson Hall, headquarters of the APG, while the high command looked on.

Scattered through the 2,900,000 cubic feet of the hangar is an assortment of infernal machines. In a corner is a small, thick-walled room that might have come from a Chas. Addams cartoon. Once locked inside, you may be snatched off on a tour of the world's most forsaken areas, from Burma in the monsoon season to an Arctic midnight, then back to the Sahara Desert.

But, valuable as it is, the climatic hangar is only a small part of the equipment massed at Eglin. Even a relatively small department like Measurements and Analysis is vital to the success of the APG mission. This is Eglin's version of the Bureau of Standards which, as someone once observed, is supposed to "measure and calibrate anything—anything at all." All test data is submitted to the department's military and civilian technicians who examine everything from tiny electric timepieces to the bombing efficiency of a B-50 squadron.

The group's activities are not confined to the laboratory however. By proxy, an analyst often rides along on the target of a jet fighter's machine guns. Special movie cameras mounted in the target itself record such data as the fighter's angle of dive and approach speed. If nothing else, a bullet-riddled camera shows that the pilot was a good marksman.

Since Eglin completes about 25 projects every 30 days, and since dozens of tests are often run on a single project, this department processes a tremendous amount of data in a month. Facts and figures in the form of tables and graphs are relayed to project evaluation officers who complete the Air Proving Ground program by sending on the results to combat air commands and Air Force development experts.

Dozens of individual tests running simultaneously on the 10 auxiliary fields of the sprawling reservation and its 30 bombing and gunnery ranges feed the computers of Eglin's laboratories. A Cook's tour—which would have to be taken by plane since Eglin covers 800 square miles—could witness in a single day a B-36 bombing from 40,000 feet while sparring with F-86's; assault transports operating from an unprepared field; the camera-carrying RB-45 screaming over the trees at 500 m.p.h.; napalm attacks by F-80's, F-84's and F-86's on tanks hidden among the trees; and F-84's using JATO for 45° take-offs.

Simulated air battles rage day and night over the vast Eglin reservation. Bombers make their runs and fighters defend.

Strapped in the seats of their F-94's, pilots and radar observers wait in the darkness on the runway, listening for ground radar reports of attackers who may drive in from the west or circle far out over the Gulf before starting their runs. Once airborne, the fighters use tricks of teamwork they have worked out in long hours of experiment high over the reservation.

Night machine gun duels at 600 m.p.h. are fought with signal lamps. When either a bomber or fighter can fire an accurate burst at his opponent, he flashes on his recognition lights. The victim acknowledges with his light—and then starts to worry about the report he'll write.

Reports are voluminous. Without an accurate tabulation an operation is worthless. The performance of every piece of equipment used in the battle is recorded. Cameras follow the image of a radar screen while a stop-watch clicks off the time of exposures. Cameras and sound recorders ride with pilots and gunners. In their evaluations, the analysts may draw on a full chronological record of the operation.

Here is the meat of aerial combat. If an interceptor is too slow, here is where the weakness shows. If a B-50 formation presents too many easy targets, the defense of Eglin will spot every one. A radar set that can't track the bombing run of high-altitude bombers using countermeasures is useless, and changes have to be made.

Even though such sharp competition increases the efficiency, it hasn't eased the traditional rivalry between fighter and bomber pilots. Every mission is a Harvard-Yale game complete with old grads rooting in the stands. But as one B-50 pilot put it, "Thank God those other guys are on our side." END

Headquarters Command

(*Continued from page* 122)

furnished with curtains, floor lamps, metal clothes closets and wastebaskets.

The airmen assigned to Headquarters Command, USAF, don't eat in mess halls, either. They are served meals in the command's dining halls, where old-fashioned 10-man tables have been replaced by four-man pedestal tables that give more elbow room. Floors are tiled in bright asphalt, the walls are light-colored, the lighting is fluorescent—and in some of the dining halls there is even a background of soft music.

But dining room atmosphere means little if the food's not good. The command has set up a food service training course in cooperation with three of Washington's largest hotels. Professional hotel chefs teach Air Force cooks from bases all over the U. S. to add a *soupcon* of this and a garnish of that to produce meals for the AF in a manner followed by the world's best eating places.

Bolling looks like an airbase, but not like any other airbase you've seen. The model barracks and dining halls are located on a base with multi-colored temporary buildings—painted in 12 pastel shades which follow the principles of camouflage and also give each structure a bit of originality through a unique color code system worked out by the command. If an airman is not color blind and knows the code, he has no trouble finding his way around.

The command, which was established in 1946 as a housekeeping and service unit for USAF Headquarters, also has the job of providing aircraft for proficiency flights by the area's AF personnel. It provides administrative and logistic support to local AF units incapable of self-support, and provides other services when ordered by USAF Headquarters.

Air Force officers working at the Pentagon and at other AF units in downtown Washington do their proficiency flying at Bolling and Andrews. Mobilization Day designees get their flight time at Andrews, as do all foreign national pilots assigned to AF units or to diplomatic organizations in the capital. It's not unusual at Andrews to see a fully-uniformed French Air Force pilot and his USAF co-pilot taxiing out for take-off in a B-25.

Pilots who have previously flown jets can go to Andrews for re-checks in T-33 jet trainers.

Andrews' mechanics maintain the Air Force's latest aircraft, which pass through the base regularly. Three mobile machine-shops, each the size of a trailer truck, are in constant operation at the sprawling Maryland base. These shops, with four-man crews, can move to areas where emergency repairs are needed.

Andrews is also the home of MATS headquarters and of the Air National Guard's "White House Squadron," called to active duty several months ago.

In December, 1949, a civilian airliner coming in for landing at National Airport plowed into the Potomac River with 23 aboard. In a matter of minutes, the crash boats of the command's 1100th Rescue Boat Squadron had brought the 19 survivors ashore to waiting ambulances. Rushed to the now-famous Bolling crash ward, developed by the Headquarters Command to meet just such an emergency, most of the 19 were saved by a combination of specially-designed equipment, sufficient medical supplies, waiting beds, and an always-on-call medical staff of military specialists and civilian consultants.

Today, this innovation—a completely equipped crash ward—is standard for all AF hospitals at bases where flying is done. The USAF hospitals at Headquarters Command also maintain clinics in most diseases, with civilian specialists assigned to each clinic.

The command also has ultramodern educational centers. An airman with an eighth grade education can attend classes at Bolling's new on-base high school, take a full four-year District of Columbia Board of Education-accredited course, receive his diploma, and continue on to a bachelor's degree in the University of Maryland through that university's extension program—all during his off-duty hours. END

Procurement

(Continued from page 84)

doing a lot of preliminary work strictly on the cuff, with no absolute certainty that it will be paid.

As an example of cooperation between the industry and the fighting services, we might cite the North American *Mustang* and North American *Sabre*. The *Mustang* design was started in April, 1940, and the contract was signed in July, 1940. Yet the first flight was made only three months later—October, 1940. First deliveries began in August, 1941. North American Aviation obviously did much work before it received a contract.

The *Sabre* design was started in May, 1945, and contracted for in June, 1946. The first flight was made in October, 1947, and the first delivery in May, 1948.

The F-86 was designed for a new and then unproved engine, the GE J-47. In the case of the F-51 there was some delay on the engine but the situation was far different. In the case of the F-51, too, the bugs were taken out much later, whereas in the F-86 the development was slower, more cautious, and bugs were caught early and eliminated during early tests. The latter was, of course, under peacetime conditions so the cases are not parallel. In both instances, the manufacturer received small initial orders which were increased gradually to quantity production.

The manufacturers send proposals for new planes to the Air Materiel Command (AMC) at Wright-Patterson Air Force Base at Dayton, O, and also to the Navy. The various ideas and drawings are studied by top-flight engineers and are sent to Washington.

Meanwhile, with money for the desired aircraft in the till, the Bureau of the Budget releases it to the Air Force. Procurement and Engineering issue an approved directive to AMC saying briefly, "Go and get it—we've got dough."

In the procurement of a production aircraft, 24 distinct steps are taken, starting from strategical requirement planning to the Bureau of the Budget and Congress and going through the Office of Under Secretary of the Air Force, Procurement and Engineering and the Budget Director in Headquarters, to the offices of Procurement, Supply and Maintenance, in the Air Materiel Command, and other commands that determine changes that might have a bearing on training equipment. There are 16 moves by the Air Force and eight by the industry—24 in all.

Before going into production, two experimental planes—and sometimes more—are built by hand, with the Air Force paying the bill. The X-planes are flown and evaluated by the manufacturer and by the Air Force. Every evaluation of these experimental models is made before the Air Force decides to award contract for quantity production. Along with these physical evaluations are considered the imponderable factors of international politics.

Evaluations of experimental planes are made by specialists in aerodynam-

SOUTH KOREA: UN wounded are loaded on a Bell H-13D helicopter near Mun-mang-ni for evacuation to a rear hospital. (Acme Photo)

Mercy HAS ROTARY WINGS

The helicopter has "come into its own" in Korea. Only the most glowing reports of achievements have been attributed to military helicopters and their crews. One of the most commendable "mercy mission" performances won the Distinguished Flying Cross for the U. S. Army's Second Helicopter Detachment on January 14, 1951.

The award was made in recognition of the successful evacuation of 23 wounded men from the battlefield to a hospital 25 miles in the rear. Using four Bell H-13D helicopters, U. S. Army pilots completed the assignment in 2½ hours. One helicopter suffered 18 bullet holes during its flights.

In addition to the Army's H-13D, Bell HTL-4s are also serving in Korea. One Marine helicopter pilot made the most of his HTL-4 by evacuating four wounded (two in the cockpit and one each in litters) on one trip.

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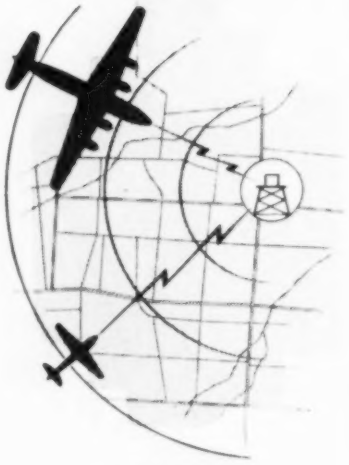

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ics, powerplants and other factors having to do with performance requirements, supply and maintenance. Handbooks are written for operation and maintenance; lists are compiled of spare parts required for the plane's operational life—usually three to seven years for a fighter, longer for a bomber, if not outmoded and reduced to training status within that time.

What can be done under the drive of war necessity is shown by the amazing history of the Boeing B-29. When the European war started, Boeing engineers were putting on paper the AAF military requirements outlined for a super bomber. But if the B-29 was to be available when needed the traditional steps of development, construction, modification and testing of experimental models had to be thrown out of the window. Long before a single B-29 existed, the AAF urged construction of huge factories to build the giant by the thousands.

In September, 1942, Eddie Allen, Boeing's chief test pilot, took up the XB-29 for the first flight, announcing simply, "It flies." But it flew with engine trouble, jammed gears, dead powerplants, fires in the nacelles—climaxing in disaster with the death of Eddie Allen and his crew on February 18, 1943, during another trial flight. Five months later, on June 27, 1943, Col. Jake Harmon successfully flew the second experimental B-29 over the Wichita, Kan., Boeing plant, where thousands of workers on round-the-clock shifts already were building more B-29's.

Working day and night, four huge bomber factories and numerous other plants making individual parts built the B-29's and rushed them to nation-wide modification centers, where necessary changes, indicated by the test flights, were made. It was like buying an ill-fitting, machine-made suit, and then tailoring parts of it by hand. On June 5, 1944, B-29's successfully completed their first mission, dropping bombs on Bangkok two short years after the super bomber made its initial flight. Men of aeronautical genius, urged on by Gen. "Hap" Arnold, had deliberately taken much more than a billion dollar gamble —and hit the jackpot.

Time necessarily must elapse before the requirements of a new type of aircraft can be evaluated; before appropriations can be voted by Congress; and before test models can be hand-built, evaluated, necessary changes made in accordance with service testing demands, and contracts let for quantity production.

Then the aircraft factories must tool up for that quantity production, workers must learn new individual operations, and usually hundreds or thousands of untrained workers must be hired and taught jobs that are entirely new to them. The public may read in the newspapers that so many billions of dollars have been appropriated for aircraft and rest complacent in the belief that adequate provisions have been made for national safety. Money appropriated, however, takes a long time to be translated into aircraft in combat.

Take for example the famous B-36, for which the design competition was initiated April 11, 1941. A contract for two experimental B-36 models was approved by the Undersecretary of War on November 15, 1941. Letter of Intent for 100 B-36's was dated July 23, 1942. (This order was later reduced to 95 because of rising costs, design changes, and so on.) Start of the actual construction of the first experimental model, the XB-36, was the end of 1942, following the transfer of the full-scale wooden mock-up from Convair's San Diego factory to Fort Worth in August, 1942.

The first shop orders for the first production model B-36 were released in October, 1943; but because of emphasis on B-24 and B-32 production programs, releases of shop orders on a full-scale basis did not begin until after VJ Day in 1945—four years after the design competition was initiated. And just such another delay, it should be pointed out, probably would occur with the production of any completely new type of aircraft during another war. The need for continued quantity production of planes already rolling off the production lines might be expected to delay the production of newer, more advanced types.

The YB-36, the second experimental model, was the production prototype and was the first plane to go down a B-36 assembly line, being placed into "major mating"—that is, joining wings and fuselage—on July 15, 1946, a year after full-scale release of shop orders began. The first flight of the experimental XB-36 was on August 8, 1946, and of the A model on August 28, 1947. The first B-36 delivery to the Air Force was on August 30, 1947. This was the first production model, which was flown to Wright-Patterson AFB for static testing. Actual quantity production of the B-36 did not begin until early 1948.

This time lapse of nearly seven years from the first letter contract to full production is certainly not too long for a bomber, particularly one as big and as complicated as the B-36. But of course the time lapse would have been less if the B-36 had been given first priority from its inception, an impossibility because of pressing need for smaller bombers already in production.

It must be remembered that wars are fought at their beginnings only with the equipment on hand, not with what may be made available in one year, or even in one month. When the shooting started in Korea the American aircraft industry was producing only 215 military airplanes per month. We lost more than that number in one day during the last war.

This production of military planes is less than one-tenth the number we were producing at the time of Pearl Harbor. In December, 1941, the industry built 2,429 planes, and the following month nearly 3,000. Six months later, July, 1942, planes were being delivered at the rate of 4,000 a month. And, even so, we weren't properly prepared for war at that time, any more than we were for the Korean War. END

Air Training Command

(Continued from page 80)

ducted to help you choose the kind of Air Force job you like best and for which you are qualified. Part of this program, the new Airmen Career Exhibit at Lackland, is as fascinating to operate as a pinball machine. It looks like a miniature world's fair, with dozens of working models of planes, trucks, bulldozers and truckers—and with airmen actually at work at various Air Force career fields. You can flick a switch or turn a knob and see yourself at work at any one of dozens of jobs taught by the Air Training Command. A graphic "career ladder" tells you how you can advance in any given field.

From an animated model constructed at Chanute Air Force Base, Ill., you learn how you can follow any one of 31 courses offered at that base. They range from learning how to be a mechanic, aircraft welder or sheet metal worker to an operator of a synthetic trainer, a control tower operator or weather observer. You find that at Keesler Air Force Base, Miss., you can take courses in radar and electronics, and that at Lowry Air Force Base near Denver you can train in intelligence, comptroller work, supply, transportation, photography, firefighting and armament. Francis E. Warren Air Force Base, Wyo., trains specialists in administration, automotive equipment, fixed wire communications, and the installation and operation of such equipment as electrical generators, motors, rectifiers, and circuit breakers. Radio repairmen are trained at Scott Air Force Base, Ill., and airplane and engine mechanics at Sheppard Air Force Base.

If you are a college man, you have a chance to attend the Air Force Officer Candidate School, conducted at Lackland. Unlike the flying training program which also awards Air Force commissions, the OCS training is not directed toward teaching a specific skill but toward developing qualities of character and leadership.

The more glamorous aspects of Air Force training are well known. A picture of a native son who has won his bars and wings as an Air Force pilot or navigator has appeared in practically every U. S. newspaper. Less well-known is the jet-fast progress this training has made. In the 300-m.p.h. era of a few years ago, aviation cadets started primary flying in 90-m.p.h., 200-h.p. planes, then progressed after a few months to a 450-h.p. plane that cruised at about 140 m.p.h. This training prepared them for World War II planes like the F-51 and B-25. Today they must be prepared for the F-86 and the B-36.

If you have qualified as an aviation cadet ($20\frac{1}{2}$ to $26\frac{1}{2}$ years old, two years of college, rigid physical, mental and moral qualifications) you will report direct to a *basic* flying school. Primary flight training has been eliminated. You may go to one of three basic flying schools in Texas (Perrin, Goodfellow or Connally) or to one of the civilian-operated contract schools recently opened at

Here's why those in the know

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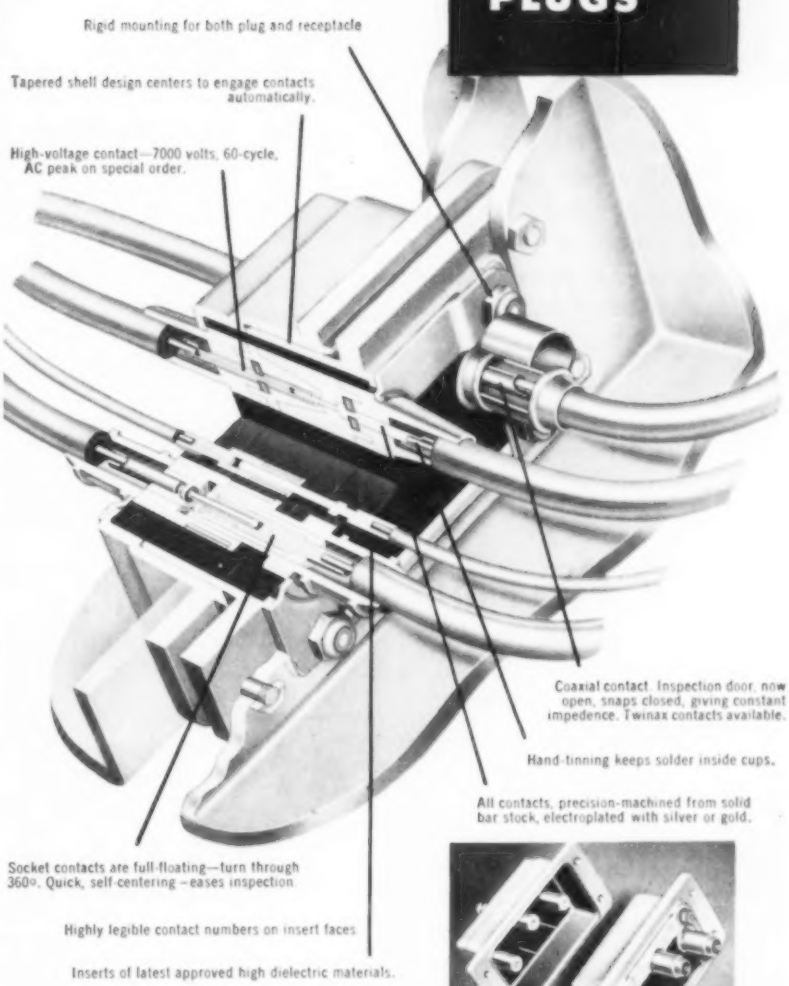
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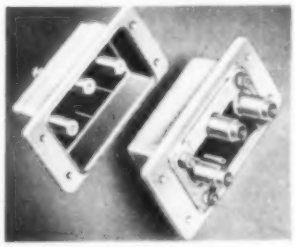

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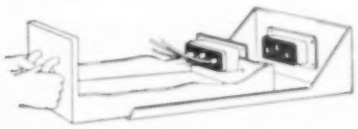

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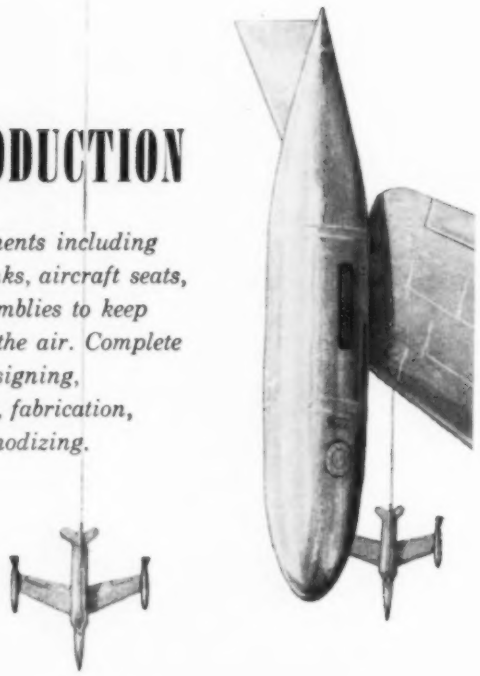

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Training for Air Force navigators also has changed. Today's 600-m.p.h. airplanes and the new importance of all-weather flying have necessitated new equipment and short-cut computing techniques for navigation. Cadets are trained at Ellington Air Force Base, Tex., in 40 weeks.

The aerial observer and bombardier goes to school at Mather Air Force Base, Calif. And a fighter gunnery research and development program at Nellis Air Force Base, Nev., keeps abreast of latest developments in aerial gunnery. Project officers from tactical units attend eight-week classes where they work out fighter gunnery techniques in the latest equipment. Flexible gunnery is operated on the same scale at Lowry AFB, Colo.

Two other specialized flying training courses, helicopter pilot training and instrument pilot training, also supply interim needs and improvise new methods.

Crew training also has an embryonic start in the Air Training Command. Shortly after the Korean War started, aviation cadets at Nellis Air Force Base were moved to other schools to make way for fighter transition training for rated pilots going overseas. Boeing B-29 *(Superfort)* training is crowding conventional pilot training out of Randolph Air Force Base. Crew training for the new jet bombers—the B-45 and B-47—is on the horizon.

The giant training program is directed toward a single post-graduate purpose. Its graduate students are the men responsible for America's wartime tank-busting jet strafing attacks and saturation bomber raids. Every Air Training Command graduate is ready for a key job during the United States' most crucial decade. END

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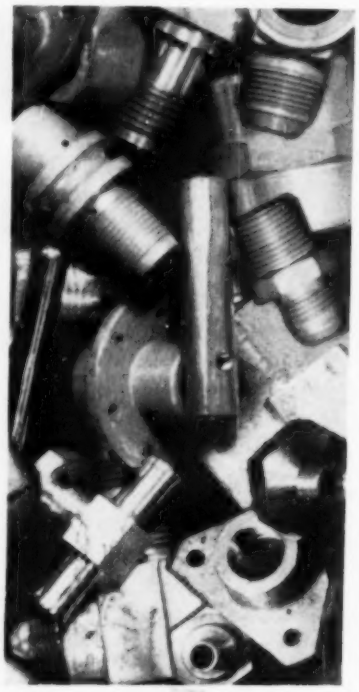

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Continental Air Command

(Continued from page 76)

In recent years CAP has performed valuable service for the nation in search and rescue missions performed both independently and in conjunction with the Air Rescue Service of the Military Air Transport Service. When flying missions requested by Air Rescue Service, the CAP is reimbursed for fuel expended; but there is no other compensation.

Many times CAP aircraft have airlifted medical aid and supplies to snowbound and flood-bound persons, carried messages, and flown forest and public utility patrols. Its huge 6,000-station radio net, an emergency communications system which has proved its utility on many occasions, maintains a high state of proficiency and stands ready to serve as needed in time of local or national disturbances.

How the ConAC works with the reserves can be explained simply.

The Continental Air Command is charged with training, administration and utilization of most United States Air Force Reserve Forces up to the time they are called to active duty.

For example, Air Force Reserve Officers' Training Corps cadets study in courses designed and taught by ConAC.

When pilots request active duty, they go through ConAC procedures.

Air National Guard units follow ConAC-outlined training schedules.

Even the "Explorer" program of the Boy Scouts is directed by ConAC.

Continental Air Command is primarily administrative—the outfit that has the task of tying all the threads together, to maintain a constantly-trained backlog of personnel for national emergencies.

Another enthusiastic branch of the reserve forces is composed of senior members of the Boy Scouts of America who, as "Explorers," study navigational aids, aviation first aid, meteorology and other allied aviation subjects.

The present reserve program will, to a large extent, go into mothballs as the nation moves toward general mobilization and trained reserve forces are called into active service. Today, these reservists are merging with regulars of the USAF to form the constitutionally-authorized wartime Air Force of the United States (AFUS). END

Special Weapons

(Continued from page 92)

to provide national security by tightly controlling the dissemination of "Restricted Data;" on the other hand was the desire to attain the greatest possible utilization of this new source of power which requires a rather wide distribution of information. The basic conflict of aims, further complicated by the complex nature of nuclear physics itself, presented the Air Force with a major organizational problem.

After considerable deliberation a decision was reached to establish a new staff agency known as the "Air Force Office for Atomic Energy." It was staffed by as many atomic specialists as possible, thus pooling much of the existing talent. The mission assigned was one of monitoring all atomic aspects of the Air Force's activities and providing the operating agencies of the Air Force with assistance on atomic energy matters. The new staff agency also had to present Air Force atomic needs to the Atomic Energy Commission.

Meanwhile, to allow the military a stronger voice in the atomic program, the Armed Forces Special Weapons Project (AFSWP) was created, headed by Lieut. Gen. Leslie R. Groves. The AFSWP activities were pinpointed at Sandia Base near Albuquerque, N. Mex., in order to provide military contact with the Atomic Energy Commission.

The most vocal proponent of an Air Force Special Weapons Command up to this time had been Maj. Gen. Curtis E. LeMay, then Deputy Chief of Staff, Research and Development, but the idea also had become clear to a number of other Air Force officers. With the transfer of General LeMay to Wiesbaden as head of the USAF in Europe, the late Gen. Muir S. Fairchild, USAF Vice Chief of Staff, took up where LeMay left off in pushing the Air Force's special weapons project.

From this mingling of ideas, the Special Weapons Command (SWC) was activated at Kirtland AFB, N. Mex., on December 1, 1948. Contrary to what might be expected, no mass influx of personnel resulted from the activation. The cadre of the SWC already was there, functioning as the Field Office for Atomic Energy, a mysterious tenant on the base since 1947.

Called the crossroads of the southwest, Kirtland is an ideal location for the home of the Special Weapons Command. Situated on a mile-high plateau overlooking the city of Albuquerque, it is adjacent to Sandia Base which houses the AFSWP and the Sandia Laboratories of the AEC. It is just 60 airline miles south of the AEC's Los Alamos atomic laboratories and 180 miles north of White Sands Proving Grounds. As one of the busiest airfields in the nation, Kirtland averages a landing or take-off every two and a half minutes.

The mission of the Special Weapons Command can be described briefly in two words—"atomic preparedness."

It is responsible for maintaining a test facility that will provide the Air Force, the AEC, their contractors, and other agencies of the Department of Defense with an organization for the development-testing of atomic or other special weapons and for determining the adequacy of airborne vehicles to carry them.

SWC also is responsible for maintaining a library, the only one of its kind in existence, which is a repository of scientific and technical information pertaining to special weapons development and associated special techniques.

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The third part of its mission embraces the USAF Reserves. SWC is responsible for organizing and administering a special reserve training program for AF reservists who are employees of the AEC and its contractors. This nation-wide task is as yet in its infancy but is growing rapidly. Its purpose is to give reservists special training and orderly mobilization in their specialized fields.

Operationally, the Special Weapons Command fits into the atomic strike picture as a final step in proof-testing atomic weapons.

The only jet fighter organization within 100 miles of Los Alamos is at Kirtland AFB. The 93rd Fighter Interceptor Squadron, equipped with F-86s, is the logical organization to monitor air traffic moving through this vital area. The Department of Defense has ordered that all air traffic operating above 10,000 feet within 150 miles of Los Alamos must file flight plans.

The problem of special weapons systems is of particular interest to the Special Weapons Command. A bomb is worthless unless it can be delivered accurately. Therefore, we must know about its trajectory. From there we go on to bomb sighting systems, defense of the aircraft, and armament systems. All in all, a host of separate items must be considered, a gigantic problem of evaluation.

Among the current Air Force planes which have been tested at Kirtland AFB by the Special Weapons Command are the B-29, the world's first atomic bomber, the B-50, the B-36, and the B-47 six-engined jet.

These aircraft are put through their paces, then are judged as to their ability as a special weapons carrier. Bomb sighting, systems of defense, aircraft armament, all are integrated into an atomic "special delivery."

Working in close cooperation with the SWC are the Strategic Air Command and the Air Materiel Command. Both of these Commands, in addition to Headquarters USAF, maintain resident liaison with the Special Weapons Command.

As might be expected, the average educational level within the Special Weapons Command is unusually high. It's only natural that in most Air Force organizations the talk runs mainly to flying, but in SWC headquarters you're more likely to find the men talking about bio-chemistry, nuclear physics, petroleum engineering—and even higher mathematics. The Command has on its staff seven officers who have received Ph.D. degrees, the majority in nuclear physics, and the rest in mathematics and electronics. Twelve have Master of Science degrees. Combined with a large number of A.B.'s and B.S.'s, the SWC degree total would make a very respectable showing on many an American college faculty.

SWC concentrates on the task of keeping the Air Staff completely informed on all aspects of atomic warfare in order that the Air Force may plan its atomic preparedness. It is working with other members of the USAF to create atomic firepower to protect our nation. END

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Your New Air Force

(*Continued from page* 34)

18, 1947. It has been changed only slightly since.

The United States Air Force now operates under the Department of the Air Force, within the Department of Defense, as established by provisions of the National Security Act of July 26, 1947, amended by Act of August 10, 1949.

There are four combat commands, nine supporting commands, and five overseas commands, which are described in detail in this special issue of FLYING.

A notable achievement of the Air Force in the past was in connection with the Russian blockade of Berlin imposed in the summer of 1948. The necessity of performing the airlift supply for 2,250,000 people in Berlin from June 26, 1948, to September 30, 1949, proved a diversion from the Air Force's main task of rebuilding operational effectiveness but gave it invaluable experience and new stature. It provided challenges and opportunities that, in the end, contributed notably to the development of techniques and to the refinement of the total activity.

In the "Good Friday" lift of mid-April 1949, 12,941 tons of food, clothing, fuel and other supplies were flown in to the beleaguered city in 24 hours. Almost 2,500,000 tons of supplies were carried in the 15 months of airlift in an air logistics feat that far surpassed the air supply of China over the "Hump."

The attention to research and development which has characterized U. S. military aviation from its inception in 1907, has been considerably increased since the war and has led to the rapid development of jet and rocket air power; to the development of a long-range intercontinental bomber, the B-36; to the establishment of records for long-range, high altitude, and speed flights; and to notable experiments with guided missiles, which had been but little developed at the close of World War II.

Particularly significant in pointing the way to future experiments and developments, and the use of air power were the flights of a C-54 transport aircraft across the Atlantic, under the control of a mechanical automatic "pilot," in the fall of 1947; and the many flights of the Bell X-1 supersonic research aircraft after October, 1947, at a speed hundreds of miles in excess of the speed of sound.

In October, 1949, Congress authorized an air engineering development center to provide the military services, private institutions, and industry with greater facilities for exploring the aeronautical field beyond the sonic barrier. This center, now under construction at Tullahoma, Tenn., has been named the Arnold Engineering Development Center in honor of General of the Air Force Henry H. Arnold, who died on January 16, 1950.

General Arnold's long military career paralleled the life of the Air Force and he, more than anyone else, had been responsible for building the AAF of World War II. With his death one of the strongest links of the USAF with its past was severed. The new development center named in his honor will be a major force in creating the Air Force of the future.

Two other major construction activities of the Air Force, authorized by special legislation and separate appropriations of Congress, are the Long-Range Proving Ground and the Aircraft Control and Warning System. Both of these installations are treated in this issue.

When war broke out in Korea on June 25, 1950, the USAF accomplished the evacuation of U. S. nationals from the area of conflict with troop carrier aircraft. F-80's and F-82's, based in Japan, protected the evacuation area and escorted the transport planes. As a result of President Truman's decision on June 27 to use U. S. air and naval forces to carry out the mandate of the United Nations Security Council, the Far East Air Forces began active combat operations. During the afternoon of that day, while carrying out their assigned missions, American fighters destroyed six Korean Communist planes.

F-51 and F-80 fighters helped halt the crushing mechanized advance of the Korean Communist army, while B-26 and B-29 bombers flew far behind the fighting lines to blast the invader's production, supply, and distribution plants and depots. Major bombing missions were carried out against Communist-held Seoul, the Communist capital, Pyongyang, and the Wonsan oil refineries and factories.

The Air Force concentrated on giving tactical support to the ground and naval forces, and seriously disrupted the enemy's war-making capacity. With the entry of the Chinese Communists into the conflict, the war took a different turn but the Air Force continued to support ground troops, to cut enemy supply lines, to destroy enemy troops and equipment and to perform fully those roles of tactical warfare for which the experiences of World War II had given it valuable training.

As an immediate result of the Korean incident, Congress passed legislation authorizing a 70-group Air Force, suspended the personnel ceiling, and made supplementary appropriations increasing the military budget for fiscal year 1951 from 13 billion to 24 billion dollars. There was a general acceleration of the program to meet increased defense needs but the Air Force, in the second half of 1950, continued to emphasize the long-range program, especially in the field of research and development, to insure the air superiority which the United States must maintain.

With the appropriation of additional funds for the Mutual Defense Assistance Program in connection with the North Atlantic Treaty Organization, military assistance to other members of the Atlantic community became a major Air Force activity rather than a special project.

Next to the National Security Act of 1947, the Army and Air Force Authorization Act of 1950 is the most significant piece of legislation in the history of the Air Force. This Act (Public Law 604—81st Congress) authorizes the composition of an Army and an Air Force of the United States capable, in conjunction with the other armed services, "of overcoming any nations responsible for aggressive acts imperiling the peace and security of the United States." The Act stipulates that the Air Force of the United States (AFUS) mobilized in the event of war shall consist of the USAF (the regular air force), the Air National Guard, and the Air Reserve. It authorizes a strength not to exceed 70 USAF groups (with separate squadrons, reserve groups and other units as may be required), and authorizes an active-duty personnel strength of 502,000 officers, warrant officers and airmen on duty with the USAF, 150,000 in the Air National Guard, 500,000 in the Air Reserve, and 24,000 serviceable aircraft.

Thus this act authorizes the strength and the program that has long been the peacetime goal of the USAF as the minimum Air Force necessary to preserve the peace and guarantee the security of the United States. END

Northeast Air Command

(*Continued from page* 71)

The cable crews—normally composed of seven men, headed by a non-com—live in "repeater stations" along the Canadian National railway. Each repeater station has its own dayroom, hot and cold water, a bunk room, and a well-equipped kitchen. There is a maximum of privacy and convenience, minus the usual routine of garrison formations. These snug homes are a strong drawing card for the men assigned to this job.

And it's often a backbreaking job. Not long ago the telephone cable snapped on top of 1700-foot Table Mountain, near the southwest coast of Newfoundland. Since the road was impassable the men and equipment were flown as close as possible to the broken cable. For the next two weeks they worked in zero temperatures while crouched on the 70° slope of the mountain. At one time during the cable-splicing job the wind turned into a 50-m.p.h. gale and the men, unable to stand, had to crawl on their hands and knees.

Typical of the excellent cooperation between the Canadians and Americans is the fact that during this repair job the Canadian Department of Transport staff furnished billets and additional equipment for our men.

The Newfoundlanders, too, have been extremely helpful in every way possible and, in turn, the U. S. services have bolstered the economy of Newfoundland by giving employment to thousands. In addition, U. S. personnel have made a number of mercy flights to save civilians, have assisted in search and rescue missions, and given help in local emergencies.

It's this kind of mutual assistance and cooperation that makes the "Circle Northeast" insignia a welcome sight anywhere in the far north. END

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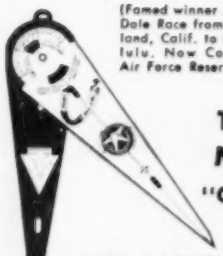

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Inspector General

(*Continued from page* 113)

Inspection. Maintenance of aircraft and related equipment problems are investigated by the Directorate of Technical Inspection. And, lumped under the jurisdiction of the Deputy Inspector General stationed at Kelly Air Force Base, Tex., are all other phases of inspection.

The office of the Deputy Inspector General makes it a practice to assign investigators to commands where they have actually served. In this way, the officers who must ferret out the rights and wrongs of an air base in Germany, for example, already know the special idiosyncrasies of that base because they have seen it during normal operations on a day by day basis.

Highly specialized fields such as armament, weather, communications and atomic energy are investigated by officers trained specifically for the job.

Each of these teams and individual specialists report inconsistencies with top level planning. But merely a negative comment is not enough. They are also concerned with working out recommendations to improve the inadequacies or obsolete methods which they are reporting.

Though the arrival of an Inspector General's team may cause a certain amount of nervous consternation, loosening of shirt collars and mopping of brows, this is more in the spirit of general fanfare than specific guilt complexes. In reality, all organizations within the Air Force are grateful for the constructive suggestions and the increased efficiency made possible by these teams.

This point is illustrated vividly by the gains from the Flight Safety Research Division. So far there is no Utopia which boasts an "accidentless" Air Force. Planes crash in mid-air. Landings are made in places not meant to be runways. Fuel lines break. Pilots black out. Engines catch on fire in flight and engine failures occur at inopportune moments. Why? What causes an accident?

The Air Force follows up each accident instantaneously with a member of the Flight Safety group. He is on hand almost as fast as the doctor or the fire department.

Every shred of evidence which can throw light upon why that particular accident happened is gathered, weighed, and used to prevent any other such accident. Surviving crew members are interviewed. The wreckage is minutely examined. Maintenance men who last worked on the plane are interrogated. Last minute conversations with the crew are brought to light. Radio reports during the flight are studied. Witnesses of the accident are questioned. Background accounts of crew members and the plane are checked.

Through such analyses, Flight Safety Research teams have managed to prevent further such accidents even though every crew member of the luckless plane may have been killed instantly and though the wreckage was nearly unrecognizable. There simply is no such thing as an un-

explored accident in the Air Force. The "explorers" are made up of aeronautical engineers, accident investigators and analysts, consulting engineers from the major aircraft, engine and accessory manufacturers, and psychologists and physiologists.

It is not just through learning from failures that the Air Force makes progress in flight safety. Researchers constantly search for new devices to make flying safer than it has been in the past. The results of this research are improved personal equipment such as parachutes, safety harnesses, protective helmets, safety belts; and internal aircraft structures such as the ejection seat which is geared to shoot the pilot right out of a jet aircraft when he must bail out of his plane. Proof of the success of Flight Safety Research is attested by the fact that the aircraft accident rate in the Air Force has declined steadily since the close of World War II. This reduction in the accident rate was accomplished in the face of revolutionary technological developments and the change from conventional aircraft to high-speed jets.

The third corps of inspectors is listed under the Directorate of Technical Inspection. This group insures that maintenance of Air Force aircraft and allied equipment is of the highest quality. It determines the quality and effectiveness of aircraft maintenance, modifications or overhaul. Detailed inspections of individual aircraft determine the adequacy of Air Force instructions, procedures, and stock-level systems.

One important phase of the Technical Inspection activity is its "Unsatisfactory Report" system. Any time an item of equipment shows the least sign of failure, a "UR" is submitted immediately. The evaluation of this information furnishes the technical inspectors with valuable leads toward correcting deficiencies.

Few people realize that most Air Force funds are used to buy supplies and equipment. The fourth group—the Director of Procurement Inspection—checks the efficiency, economy and effectiveness of the industrial procurement program.

Procurement inspection usually is conducted in the plants of the contractors. The Procurement Inspector is concerned mainly with proper contract administration to assure that material and supplies will be received (1) at the specified time and place, (2) in quantities and qualities required, (3) at a fair and reasonable cost.

The Directorate of Special Investigations (OSI) has the job of investigating crime, other violations of public trust, and subversive and related activities within the jurisdiction of the Air Force.

Completely contrary to the cinema version of investigative organizations, OSI is basically a fact-finding agency. The personnel go about their duties much in the same manner as any official or businessman. An organization such as this constantly deals in matters affecting the interests of national defense and the lives and future of personnel. Reports of investigation are safeguarded for the best interests of national defense and this activity, patterned after the FBI, is

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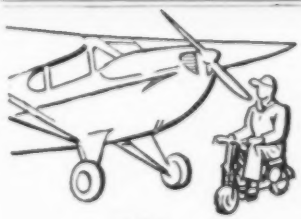

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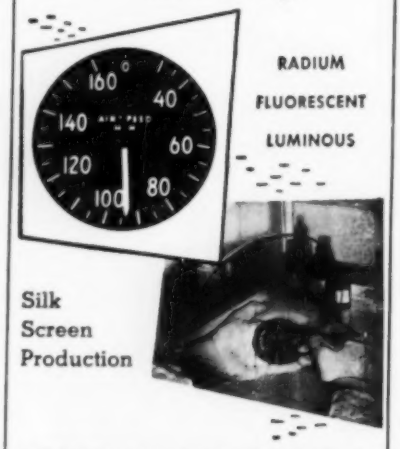

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Last of the inspecting groups is the Air Provost Marshal. To him fall the supervision of discipline, security, confinement of prisoners, and activities of Air Policemen throughout the USAF.

The Air Policeman is the Air Force's fighting man on the ground. Within the United States is a small but powerful dissident group which would strike to hamper our attacking arms in time of war. To counter the force of such a group, the Air Provost Marshal of the USAF has as his most important duty the protection of the men and materiel of the Air Force.

He has planned defense of Air Force installations so that one Air Policeman has the effectiveness of five interior guards patrolling military posts. Every vital area is covered.

The Air Policeman is always in the public eye in his town patrol duties. Almost every town or city adjacent to an Air Force installation has its quota of patrolling Air Police who guarantee that airmen seeking amusement adhere to high standards of deportment.

The Air Provost Marshal is also the watchdog of Air Force secrets. Through programs of education, indoctrination and enforcement, the Air Provost Marshal protects classified matter of the Air Force from falling into enemy hands. Along with the Directorate of Special Investigations, he clears civilian and military personnel for access to classified matters. The Air Provost Marshal also monitors a far-flung program of security in plants and factories producing materials for the Air Force.

The network of inspecting branches combines to make the Command Investigations System of the Air Force. By compiling all of their information the Inspector General is able to keep the Chief of Staff thoroughly briefed on the current operational, tactical and logistical status of the U.S. Air Force. END

Photo Reconnaissance

(*Continued from page* 125)

then you probably get a check list of all items which you are supposed to cover.

At eight o'clock that night you take off. The photo-navigator is in front, up in the nose of the plane where his radar camera is located. The plane also has other camera installations—vertical and trimetrogon, which are suitable for day operation—but you won't use them on this trip.

En route, the radar operator practices picking up ground objects on the scope, testing his set to be sure of satisfactory operation. As you near the target, the photo-navigator begins recording the radar scope by photographing it with a 35-mm. camera. When the required information is on film, you scoot for home in your sleek jet.

On the run, which lasted only a minute or so, you had to maintain an unwavering course and altitude. If the mission had been flown in wartime, the enemy would have had opportunity for unrestricted antiaircraft fire against the lone aircraft.

As you land back at base, a crew of men from Reconnaissance Technical Squadron (familiarly known as Recce Tech) take the exposed film and rush it to the laboratories. You check in for interrogation by the same officers who gave the original briefing. Your job is done.

But the radar pictures which you brought back are now being processed and analyzed by a highly-trained group of Recce Tech specialists. They make a report on the results and send copies to all using agencies, including the bomber command. The whole process occurs in a matter of hours—and your bombers now have the information they need to proceed with their mission.

Each of the three Strategic Air Command bomber forces has its own reconnaissance units. They are equipped with recon versions of standard bombers, designated RB's. Each photo recon unit has two separate departments, tactical and technical. The tactical unit maintains and operates the aircraft, and the technical department prepares maps and aeronautical charts from their own original photos and photos received from all other possible sources. The technical unit also has facilities for color printing which can reproduce material in any required volume.

The RB's usually use two types of photography—radar and visual. Importance of radar scope photography first was recognized in World War II. Aircraft radar reproduces prominent terrain features even though they lie hidden in darkness or shrouded by cloud formations thousands of feet thick. By photographing the light image on the radar scope, a picture is gained that gives sufficient detail for map preparation.

Several types of cameras are used in visual photography. The standard single lens, used for photographing an area vertically beneath the aircraft, helps in preparation of large-scale target charts that show layout of installations such as industrial plants or air bases. Another method of chief importance combines vertical and oblique photography. Known as the trimetrogon system, the camera has three lenses which operate simultaneously. One takes a photograph directly below the plane, the two others shoot to either side of its flight path. Placed together in mosaic, they show an area from horizon to horizon.

In wartime, the photo recon planes range into enemy territory with no guns or protective armament. Speed is their only defense against attack. Almost casually, as a matter of routine, they fly missions thousands of miles into enemy heartlands, take pictures even on the darkest nights through clouds half a mile thick. On almost every mission they prove the truth of the photo reconnaissance motto: "First and Last Over the Target." END

USAF in Europe

(Continued from page 74)

local government has sponsored at least one large housing project at Wiesbaden, the headquarters of USAFE, a spa city like Hot Springs, Ark., with a population of some 224,000 persons (excluding some 9,000 U. S. resident personnel). This project is known as "Crestview Apartments," housing some 398 American officers and families.

Organization of USAFE

The 1951 expansion program is vast and complex but to what extent USAFE is being strengthened cannot be commented upon at the present time.

Nerve center of USAFE is located 25 miles west of Frankfurt, at Wiesbaden, and 65 miles northwest of Heidelberg, operational headquarters of EUCOM. A former local government building has been requisitioned to serve as a miniature Pentagon and constitutes the only military post in Europe operated under AF jurisdiction.

Wiesbaden (Hesse) Air Base (five miles east of Wiesbaden).

- The 60th Troop Carrier Wing. Commanded by Col. James J. Roberts, Jr. Missions of the 60th TC Wing include the provision of planes (C-47, B-17 and B-26) and facilities for the administrative and proficiency flight requirements of USAFE Hq., Twelfth Air Force Hq. and Wiesbaden Military Post.
- The 7167th Special Air Missions Squadron. Squadron commander is Maj. J. A. Buckley. Planes utilized are Douglas C-47 A's and D's *(Skytrains)*, C-117 VIP-type DC-3's, and C-54's *(Skymasters)*. The planes are used for the transportation of VIP's in Europe and Africa. Long-range missions have included flights to Moscow for U. S. Ambassador Alan G. Kirk.
- The 7th Air Rescue Squadron. Commanding officer is Lieut.-Col. Walter Hamburg, Jr. The 7th ARS took part in the abortive search for the Navy PB4Y *(Privateer)* downed in the Baltic last year by Soviet fighters. The older Boeing *Flying Fortress* (known as SB-17) has been largely replaced by the recent conversion search SB-29 *(Superfortress)* for ultra long-range search. Short range rescue is carried out by the special Sikorsky H-5H helicopters.
- The 7100th Headquarters Support Wing. Commanded by Brig. Gen. Fay R. Upthegrove. This is the "housekeeping" organization for USAFE and Twelfth Air Force Hq., as well as for Army and Navy units within the jurisdiction of Wiesbaden Military Post area.

Erding (Bavaria) Air Base (20 miles north of Munich).

- The 85th Air Depot Wing. Commanded by Col. Park Holland. Takes care of the repair and maintenance of all U. S. military airplanes in Germany and Austria. Also concerned with the supply

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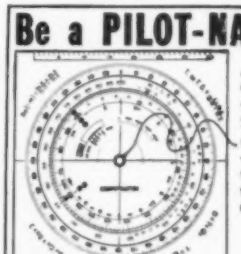

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functions of USAFE and the storage and disposition of any surplus USAF property remaining after World War II. Without this huge repair base, all such work would have to be carried out at Burtonwood in north England which has its own responsibilities to the Third Air Division.

Landsberg (Bavaria) Second Air Divisional Hq. (35 miles west of Munich) Commanded by Brig. Gen. Thomas C. Darcy. Second Air Division is the tactical unit under Twelfth Air Force. It includes the 36th and 86th Fighter-Bomber Wings and the 501st Aircraft Control and Warning Group.

- Hq. and the 501st Aircraft Control and Warning Group. Commanded by Col. Lee B. Coates. Actual tactical command Hq. is in Landsberg. The unit is responsible for tactical control of aircraft within limitations of its equipment.
- The 7030th Hq. Support Group. This group supplies the ground support necessary to operate efficiently the executive, transport and supply sides of the Second Air Division.

Furstenfeldbruck (Bavaria) Air Base (west of Munich, between Landsberg and Munich)

- The 36th Fighter-Bomber Wing. Commanded by Col. Robert L. Scott, Jr. (who wrote "God Is My Co-Pilot"). The wing is composed of three fully equipped F-84E fighter-bomber squadrons. Republic F-84E's are the standard USAFE fighter-bombers with armament of six .50 cal. M-3 machine guns in the nose, wing bombs and rocket projectiles (up to 32 x 5 in. HVAR's). Combat radius is over 1,000 miles. Speed is up to 600-plus m.p.h.

Neubiberg (Bavaria) Air Base (just east of Munich)

- The 86th Fighter-Bomber Wing. Commanded by Col. John S. Chennault, son of famed commander of the China-based "Flying Tigers." Of passing note is the fact that Neubiberg was the *Luftwaffe* air base for the fighter defense of northern Italy. Neubiberg is identical in organization and equipment to the 36th Fighter-Bomber Wing.

Rhein-Main Air Base (Rhein-Main is 12 miles south of Frankfurt)

- The 61st Troop Carrier Wing. Commanded by Col. A. C. Strickland. The 61st includes three fully equipped squadrons of Fairchild C-82A *(Packet)* cargo transports. The 61st TC Wing is the outfit which would have to bear the first brunt of a second air lift into Berlin.

Other Planes in Theater

For light liaison and transport duties, the Second Air Division employs Stinson L-5's *(Sentinels)*. For conversion training to *Thunderjets* a small number of Lockheed T-33 *(Shooting Star)* tandem trainers are available. For high-speed air-to-air gunnery, the wartime Douglas B-26 *(Invader)* is used for target-towing.

United Kingdom

Flexibility backed by extreme mobility is the keynote of the intensive training program policy adopted by the Third Air Division, commanded by Maj. Gen. Leon W. Johnson. Third Air Division furnishes housekeeping facilities and bases in the United Kingdom necessary for the continuous support of up to three Strategic Air Command (SAC) medium bomber groups (B-50 *Superfortresses*) plus one escort fighter group (F-84 *Thunderjets*) of the SAC. These units rotate every three months (90-day periods), flying from the States to bases in England for the purpose of broadening their operational experience.

Not to be minimized is the confidence and experience gained through partaking in joint exercises with the Royal Air Force and the air arms of the other cooperating powers of NATO. The teamwork evolved by this cooperation and intimate knowledge of other nations' aircraft and aircrews is the first step in the formation of a unified NATO air force in West Europe.

The 3d Air Division Headquarters

(A block of seven modern buildings sited at South Ruislip, some 12 miles from Piccadilly Circus, in the heart of London). General Johnson directs operations of the Division.

The Hq. was activated on July 16, 1948, though at that time the actual Hq. was operational at Marham (Norfolk) Air Base, moving to London a month later. Other air bases used by the Third Air Division include Mildenhall, Lakenheath and Sculthorpe, all in East Anglia, wartime home of many USAAF units, plus new air bases in the Midlands. These include Upper Heyford, Brize Norton and Fairford. An escort fighter base is at Manston in Kent, while the giant repair and supply depot is at Burtonwood near Liverpool in the North.

Burtonwood (Lancashire) Air Base

- The 59th Air Depot Wing. Commanded by Brig. Gen. Robert Oliver, the 59th AD Wing is a vital link between the vast storehouse of personnel and equipment in the States and the requirements of Third Air Division in the United Kingdom. The 59th AD Wing is responsible for logistics, the reception and distribution of all supplies, plus the complete repair and maintenance of all aircraft and components.

The Future

One thing is certain, the free peoples of Europe are quietly appreciative of the manner in which USAFE is conducting its affairs. Never before in peacetime has one major power invited the forces of another to be "in residence" in peacetime. This has happened in the United Kingdom. Great credit is due to the strict observance of local traditions and ways of life. No one can tell how long the world will be kept in a state of uneasy peace but as long as there exists any threat to the safety of the free nations in Europe, USAFE will be there backing up the forces of democracy.

—CHARLES W. CAIN

Development

(*Continued from page 89*)

were made by the Air University and by a committee of scientists headed by Dr. L. N. Ridenour, then dean of the graduate school at the University of Illinois.

Both groups reported their findings in the autumn of 1949. Strikingly similar solutions were proposed. Shortly thereafter, General Vandenberg created the post of Deputy Chief of Staff for Development and immediately appointed Maj. Gen. Gordon P. Saville to be the first DCS/D.

General Saville is both a fighter and a planner. Early in World War II he had been Director of Air Defense. Later, he became Chief of Staff of the Mediterranean Air Command, Commander of the First Tactical Air Force, Joint Air Commander for the Invasion of Southern France, deputy commander of the Air Transport Command, and Commanding General of the Air Defense Command. At the time he was named DCS/D, General Saville was Director of Requirements in the Office of the Deputy Chief of Staff for Operations.

Thus, early in 1950, Air Force research and development was made a staff-level function, co-equal with the long-established Operations, Personnel and Materiel offices. General Saville divided his mission among a group of key assistants: Maj. Gen. Carl A. Brandt; Maj. Gen. Donald L. Putt; Brig. Gen. R. C. Maude; Dr. Louis N. Ridenour, now on leave to spend full time at USAF headquarters, and Dr. Ivan Getting, lent by the Massachusetts Institute of Technology.

While this work was going ahead in Air Force headquarters, a Research and Development Command under Maj. Gen. David M. Schlatter was established at Wright-Patterson Air Force Base, Dayton, O. [See page 87.]

Since its birth, the new Air Force development structure has been growing and changing. Today it is still not in final shape. But many of the essential characteristics of the organization have been made clear by the lessons of the past 18 months. As in any development program, civilian or military, someone must foresee and state future needs, and someone must be responsible for meeting those needs.

The need for improved strategic air weapons has led us into the realm of supersonic guided missiles. Other nations have been following the same lines of development. There is no reason to believe that they will not succeed in producing weapons that will make our present air defense systems useless. For the next few years we will need faster, higher-flying interceptor fighters. Then will come a day when the guided missile will be a major weapon of air attack. On that day the defense too must be ready—with missiles the only effective countermeasure.

Whether an enemy is intercepted by piloted aircraft or guided missiles, one essential requirement of air defense will remain unchanged—a control and warning system that will enable defense units to spot the enemy and direct the course of interception.

Research and Development deals with the basic concepts of the application of air power. Too often the development of a new weapon has led simply to a bigger and better version of an existing machine. This approach has its place in the development scheme; but many times the need is not for something bigger and better but for something entirely new.

Consequently, the Air Force supports basic scientific research. Air Force funds are used in forays against the outer boundaries of theoretical scientific knowledge with little or no expectation that the discoveries will have military value. But a small percentage of the discoveries will start a chain reaction that may lead to important military weapons. Radio, radar and atomic weapons all grew from such beginnings.

Basic research is now underway in physics, chemistry, the geophysical sciences. Pioneering work is also going on in "human engineering"—the blending of skills, working conditions and morale to secure maximum results from military and civilian manpower.

Most of the Research and Development effort, however, goes into *applied* research. The project is still in the laboratory or testing stage but the researcher has a definite goal—a new interceptor

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capable of a certain performance, a better camera or an improved vacuum tube.

Among the features incorporated in new aircraft are rocket engines; movable wings, which enable the pilot to change the angle of incidence while in flight; and wings with inverse taper, wider at the tip than at the root. A three-jet bomber for close ground support is being evaluated, while new attack gliders and cargo planes are on the way. But these "bigger and better" methods are already in the area of diminishing returns.

The day is coming when designers and engineers can do little more with piloted aircraft. This is where the guided missile comes in.

Test missiles are being fired regularly as part of a missile development program started in 1945. Design and control improvements have increased the range and accuracy of missiles in recent firings.

Success in future air missions will require a 6,000-mile range in ground-to-air radio equipment and a 250-mile range in air-to-air sets. Airborne equipment must be compact enough to fit into space-short combat craft. A development program to meet these requirements already has produced powerful vacuum tubes smaller than a match and promises even more revolutionary results.

Electronics also is seeking to make a reality of the late "Hap" Arnold's vision of a truly all-weather Air Force. Even before the advent of guided missiles, new navigation and bombing aids and better blind landing systems may enable USAF planes to take off, reach and hit their target, and land safely in storm or darkness.

Electronics plays an important role in the techniques used by bombers to penetrate enemy defenses. Jammers, tuned to the frequency of enemy radars, can screen oncoming bombers or be used to produce false estimates by the enemy of their number and direction. The same measures may be used to blind fighter planes or AA guns directed by radar. While these techniques were common in World War II they are not yet perfected. We need more powerful jammers that are capable of following rapid frequency changes in tracking radars.

The third major area of applied research is armament, which deals with aircraft weapons, fire control systems, chemical, biological, high explosive and atomic bombs and bomb directing systems. Radar-controlled gun turrets, antitank rockets employing shaped charges, and more accurate gun sights are among the accomplishments of armament research.

Use of air-to-air guided missiles capable of trailing and destroying enemy aircraft is contemplated for the future. A corollary to this program is the development of methods for destroying or deflecting missiles directed at our own aircraft.

In the equipment division of Research and Development, a wide variety of projects is completed or underway. The oxygen needs of crews on long, high-altitude missions can be met, thanks to a new system of converting liquid oxygen to gaseous breathing oxygen within the aircraft. A new device will insure automatic safe opening of parachutes in high-speed, high-altitude bail-outs. Cameras that can take accurate pictures from a distance of several hundred miles have been developed. Pressure suits and ovens for cooking frozen foods in-flight are among many developments aimed at increasing the safety or comfort of flyers.

The cost of these current Air Force research and development projects is about $700,000,000. More than 80 per cent of the work is being done by 750 private firms. The remainder of the contracts are almost evenly split between other Government agencies and non-profit organizations such as universities and research foundations.

The preponderance of private industry among research and development contractors is an example of the teamwork of science, industry and the military. This team is our best weapon, General Saville said when he wrote:

"As Air Force officers, we can analyze and plan, state the need to the Congress and the people, organize and test and reorganize . . .

"But the problem is so vast that by far the greatest part of the burden must be borne by patriotic scientists and engineers in universities and in industry. Some might deplore this, believing that the military should build up a large technical staff of its own. I, on the contrary, feel that our present course is but a modern example of democracy in action." END

Operations

(*Continued from page 41*)

other personnel also must be started on their way to provide replacements for the expected attrition.

The gas and oil required, the bombs and rockets and ammo that will be dropped or shot must start on the way to the battlefront immediately. For this movement, the Navy must be called into conference for it provides transportation.

Airfields must be found that are adequate for the *Sabres*. Sometimes airfields have to be enlarged or airstrips lengthened. Housing must be provided for the men. And the Army is called in to guard the fields.

There are not hundreds, but thousands of details to be worked out in advance. The man responsible for the planning and execution of all of these operations is the DCS/O, the busiest man in the Air Force.

The DCS/O is responsible for all operational planning. The Strategic Air Command, the Tactical Air Command, Military Air Transport Service, while they are all major independent commands responsible to the Chief of Staff, are all subject to the deputy's orders. He must set down the tasks for them to do. It is then their business to accomplish these tasks.

To aid him in his work, the DCS/O has under him five directorates—for plans, intelligence, manpower and organization, operations and communications—and three special assistants—atomic energy, programming, and operations analysis.

The Directorate of Intelligence produces the air intelligence necessary to insure that the Air Force maintains strategic, tactical and technological superiority. Great emphasis has been placed on comprehensive study of foreign air forces and the capabilities and intentions of foreign powers.

While intelligence looks askance at any publicity concerning its work—and wishes that everybody, especially the enemy, would forget it exists—it is betraying no secret to note that Strategic Air Command has a file of two million items on Russia. Most of these items were collected and evaluated by the Directorate of Intelligence.

The Directorate of Plans is responsible for politico-military, strategic and operational war-planning for the Air Force. The fact that we have such excellent aircraft as the Convair B-36 and the Boeing B-47 (*Stratojet*) is due to the foresight of this department.

In the Directorate of Plans there are several planning teams. Each team is a specialist group. Each works on Air Force plans for a specially selected area, or for a special type of warfare. Still others are planning for next year, or for events 10 years from now.

During the closing days of World War II, long range Air Force planners decided that there was need for huge planes like the B-36 and the B-47 to establish our strategic air superiority. It is true that the need for these planes in 1951 is different from what it was in 1944. Nevertheless, it is fortunate for the United States that the planners did foresee a need.

It is not generally known that during World War II the Directorate of Plans was planning not only for the expected peace but also for a possible World War III. Their plans took into account not only special weapons but potential enemies against which they would be used. The power of certain nations to recover from the ravages of war was analyzed and deductions were drawn from these analyses.

When the autonomous Air Force was established, the command communications network consisted only of war-worn systems that had been left over from World War II. The men who worked with this equipment spoke of it plainly as "mostly junk."

Furthermore, the demobilization of maintenance personnel had left the USAF communications organization in a shape little better than the equipment. Therefore it was necessary to reorganize the communications activities in Headquarters, USAF, under the Directorate of Communications. The communications system was redesigned, reorganized and completely rebuilt.

This program eventually resulted in the efficient Air Force system of today, which is designed to cope with the problems of high speed, long range, all-weather planes, operating on a global basis. (For the complete story on communications see page 81.)

(*Continued on next page*)

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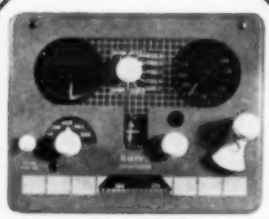

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The Directorate of Manpower and Organization is responsible for the development and maintenance of the organizational structure of the Air Force.

The Directorate of Operations is responsible for the *execution* of Air Force operations. It must make sure that the major commands do the jobs assigned to them.

In order to be sure that the plans drawn up by the plans directorate are workable, the Directorate of Operations tests them. Exercise Swarmer was one such test. Held in the Fort Bragg area of North Carolina, the exercise tested an Air Force theory that a land position could be seized by air and expanded into a full size beachhead. The exercise was a success.

In addition to the directorates, the DCS/O has three special groups or assistants.

The Assistant for Atomic Energy supervises Air Force atomic energy matters and maintains liaison between Headquarters and all other atomic energy agencies. The Assistant for Operations Analysis does just what you would suppose. He undertakes scientific studies of equipment, weapons, tactics and strategy.

The Assistant for Programming is a sort of assistant general manager to the DCS/O. He must constantly review the established priorities and policies so that the Air Force can get the most for its dollar and still reach program goals.

Beside the job of balancing the Air Force programs after the decision to send the *Sabres* to Korea, this assistant had the job of making up the personnel shortages in the Far East Air Forces. These shortages were easier to find than the planes and air crews, because there were far more of them. But the need was filled and many a young officer, comfortably at home at some quiet stateside air base, suddenly found himself going off to the war.

All of this complex machinery, all of the men and airplanes, must be coordinated by the Deputy Chief of Staff, Operations. He must answer to the Chief for the whole operations show. He must insure that the United States has the best air force in the world, ready to fight anyone, anywhere, and at anytime. END

Air Defense Command

(*Continued from page* 43)

can be expected to destroy no more than 30 per cent of the planes making an attack in strength on the United States, before their bombing missions are completed. And our preparations today are not beefed up to achieve even that figure."

That is the condition, admitted plainly and frankly by the Air Force chief of staff.

At Ent Air Force Base, Colorado Springs, Colo., Air Defense Command headquarters directs the planes, pilots, technicians and equipment of the warning and interceptor system.

It controls the nation's advance warning radar network manned by a Ground Observer Corps; the employment of the Army's antiaircraft artillery; and the killer groups of fast jet interceptor aircraft.

To administer this complex defense system, the U. S. has been divided into three parts, all directly responsible to ADC: the Eastern Air Defense Force (responsible for protection of the continental U. S. east of the 89th Meridian), the Central Air Defense Force (responsible for sectors of U. S. bounded by the 103rd and 89th Meridians, including certain portions of the southeast U. S.), and the Western Air Defense Force (responsible for area west of the 103rd Meridian).

These three Air Defense Forces are in turn subdivided into smaller areas. From the operational view, the key of the entire system is the Ground Control Intercept Unit (GCI). At GCI are plotted flight reports from Ground Observer Corps (GOC) and radar stations. And from GCI jet interceptors are ordered to identify all unidentified aircraft entering their area. Although he commands the smallest unit of air defense, the GCI commander has authority to make an immediate interception upon any plane.

The Ground Observer Corps, composed of civilian volunteers, is of major assistance to the air defense system. Throughout the coastal and northern regions of the United States about 20,000 observation posts (approximately eight miles apart) have been set up to report movements of aircraft.

At each observation post a minimum of 25 volunteers work around the clock to add vital information to the data collected from other sources. Reports of these volunteers often can determine the presence of aircraft when radar cannot. For radar, like television, operates on a line-of-sight principle.

Briefly, the system works like this:

When an aircraft is spotted by a GOC volunteer he makes an "aircraft flash" phone call to his assigned filter center. By prefacing his report with the words "aircraft flash," he notifies the local telephone operator of the urgency of his call and the need for an immediate direct line to the appropriate filter center.

When the volunteer gets his connection, usually within seconds, he reports the location, direction of flight, number, and altitude of the aircraft, plus other information he may have.

This report is received by another civilian volunteer in the filter center, who plots the report on a grid map of that area. This plot, together with plots from adjacent observation posts, shows the "track" or route taken by the aircraft as it moves within the sector.

There are 50 filter centers throughout the areas covered by observation posts. Each center is manned by approximately 500 volunteers who are trained and equipped by the Air Force. These filter centers funnel information on the movement of aircraft to the Ground Control Intercept unit commander.

The GCI has its own net of radar in addition to reports received from members of the GOC. All reports must be identified because even one enemy plane could do untold damage.

From the moment reports are received they are plotted on a grid map of the area and a check is made of all aircraft known to be in the vicinity. Should there be no record of the flight filed with the Air Force Flight Service by the Civil Aeronautics Administration or other flight agencies, the aircraft must be checked visually by a fighter interceptor.

All of this observing and reporting takes time but the decision must be made instantly when all information is at hand.

The invader is kept under radar surveillance. Meanwhile, a controller radios flight directions to the interceptor pilot. Radar then works two ways: the potential enemy is tracked by one observer while another is following the interceptor and providing him with directions for contacting the "bogey."

This type of control sometimes is the only means of making an interception. At altitudes of 30,000 or 40,000 feet it often is impossible for a pilot to contact another aircraft without the aid of radar. From that altitude the ground, if it can be seen at all, loses its distinguishing colors and does not provide a background. But the controller, watching the electronic reflections of two aircraft in his radarscope, can direct the interceptor into a position for attack from a point outside of the normal vision of the pilot.

In bad weather the controller assumes even greater importance by directing the interceptor while he is flying blind.

Simultaneously with the order to send off fighter interceptors—to "scramble" as it is called—the Air Defense Control Center is notified. Organized regionally, the ADC's receive reports from the GCI's assigned to their areas. Only two types of reports are forwarded to the ADCC: the movements of enemy aircraft and the "tracks" of all friendly intercepting aircraft.

The ADCC commander determines the disposition of forces in the event that the attack involves more than one sector. He can determine more certainly the probable target and whether the enemy aircraft are acting as decoys to draw his forces from the main attacking body.

In addition to defending the larger area, the ADCC initiates air raid warnings. Upon receiving a report of enemy aircraft, the ADCC warns selected key points along the probable path of the invader. These key point Air Raid Warning Centers are the link between the Air Force and the civil defense organizations of the individual states. Civilian communities, factories, and hospitals then are alerted by means of the systems in effect in the various states.

Although the system is complex, a civilian volunteer at an Observation Post or a radar scope operator at an isolated outpost far from any community can dispatch aircraft and sound an Air Raid Warning in a matter of minutes.

Also important is the Army Anti-Aircraft Command. As air defense is an Air Force responsibility, ADC naturally must control all available means to do the job. This means that the Air Force must have operational control over Army AA units and that the Army must furnish advice to the Air Force on the most effective employment of Army units.

Therefore an army officer and staff serves at each echelon of the Air Force Command structure.

The "hunter-killer force" within the air defense system are the interceptors, armed with guns and rockets. Fastest interceptor in the Air Force today is the North American F-86A, a clear weather jet fighter. Biggest and most powerful of the new interceptors is the Northrop F-89 which went into production last summer. It carries a large load of rockets and has the staying power needed to fly long-range patrols. Also in full production is the F-94A, built by Lockheed. Basically it is a development of the Lockheed *Shooting Star* (F-80) with a lengthened nose in which is housed airborne radar and four 50-caliber machine guns. All of these interceptors fly at speeds around or better than 600 m.p.h.

The planes, personnel and civilian observers of the Air Defense Command form the backbone of America's defense against air attack. The system isn't perfect. It can never provide the nation with complete security against aerial attack. But it is good today—and it will be better tomorrow. END

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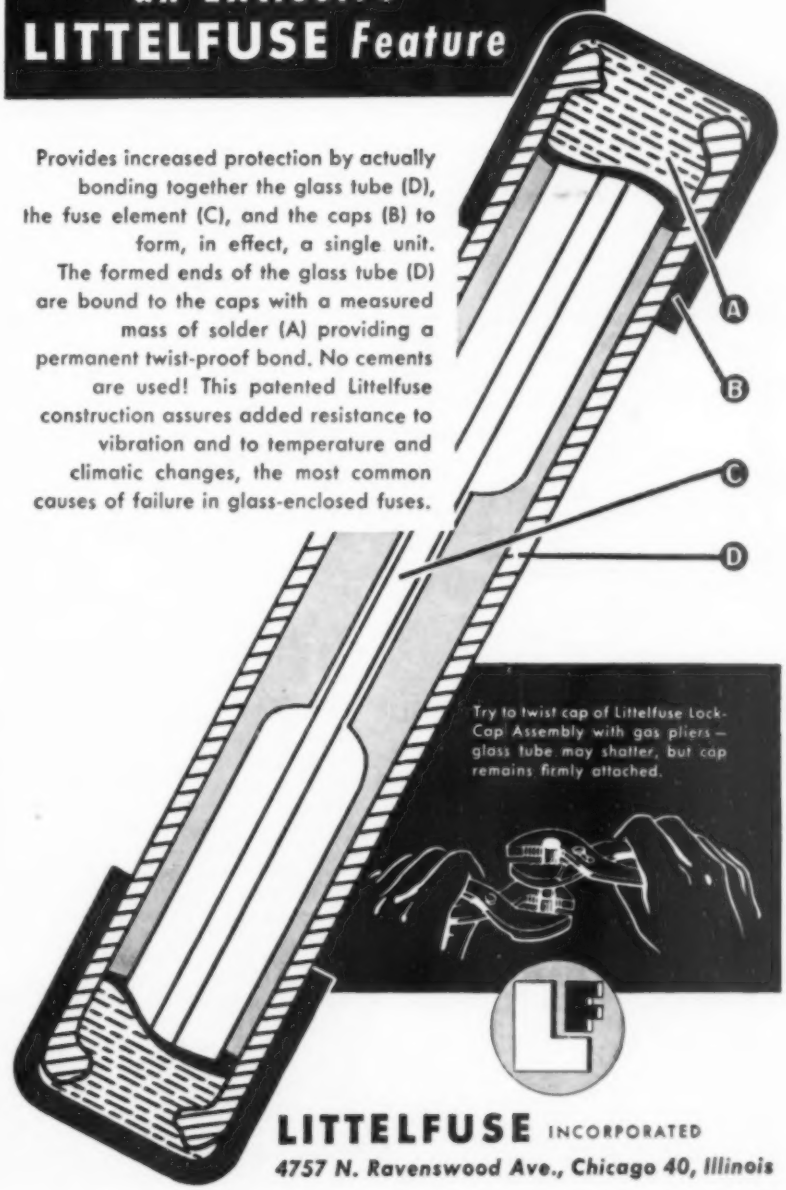
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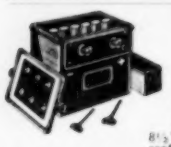

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Aeronautical Charts

(*Continued from page* 129)

inches, the same size as the instrument approach and landing chart used by conventional aircraft. Recently, an experimental size of only four-and-a-half by seven inches has been developed.

These charts, assembled in books with clear Plexiglas covers to cover various overseas areas, contain only really important information. The jet pilot's procedure track is printed in dark blue, a color that is best seen either in daylight or under red light and which also separates this vital information for him from the terrain and radio data. The back of this chart is an area chart for planning and for diversion to other than an intended airfield if necessary.

The new let-down chart is so small that the pilot can use it with one hand. A Pilot's Handbook containing these charts is only a fraction the size of the regulation handbook, which it may supersede if testing by users proves that to be advisable.

Because of rapid changes in radio information, these jet arrival letdown charts are revised frequently. A maximum of seven days is allowed from the time the new information is received by the Aeronautical Chart Service until the date when the revised chart is sent on its way to the overseas theater. On occasion, that period is reduced to five days. END

Photographic Lab

(*Continued from page* 127)

In less than two weeks we modified and expanded the experimental system into components that could be procured and built easily. We had flight tested the equipment repeatedly. Then part of the laboratory's personnel were shifted to Hill Air Force Base at Ogden, Utah, where they were given skilled cooperation in installing the new systems in the RB-26's which would fly them in Korea. Within 30 days of the go-ahead order from Air Force headquarters, the first low-altitude night photo plane containing the new system was on its way to the battle lines.

Low-altitude night photography has been of incalculable value to photo intelligence in Korea. It has helped detect at least some of our enemy's operations after the sun goes down; and it goes down very early in wintertime.

The system has at times been astonishingly successful. During a recent suspicious lull in activity on the part of the Communist forces three RB-26's were sent out to cover an area ahead of and to the right of a rather thinly held UN position. Although our troops were using high and rocky ground to protect their right flank, the position held infiltration possibilities for an alert enemy. The three photo airplanes took off in the darkness, flying parallel flight lines.

After a considerable section of terrain had been covered and the film supply exhausted, the airplanes returned to their base where the exposed film was immediately processed. Three successive pictures were taken by the light of three flash cartridges from one photo airplane. In one picture, five enemy tanks were shown moving down a road, each with its headlights on. In a picture shot three seconds after the first one, four of the tanks had extinguished their lights. The third picture and the last in the sequence, showed that all tanks were traveling with lights extinguished—a useless gesture as the photo airplane was furnishing its own illumination.

The road in the photos was quickly located on the map. It was found that the tanks were 11 miles from the lines, traveling precisely in the direction of the UN right flank. At daybreak, a search squadron, armed with rockets, took off. The tanks were located and all five were destroyed.

Recently, considerable publicity has been given the comparatively new and rather unorthodox aerial strip camera. This instrument uses no shutter, receiving the ground image through a slit which "wipes" a picture on a moving strip of film synchronized with the ground speed of the airplane. Robot-like automatic scanners capable of analyzing aircraft speed by an optical pick-up directly from the ground below the airplane are built into the camera and exactly control the speed of the moving film. Theoretically, the only limit to the flying speed at which a picture can be taken is the mechanical strength of the film and the speed of the photographic emulsion. Image motion cannot blur the picture because the film is moving with the image. Tests at Wright-Patterson AFB have demonstrated that this camera will take perfect pictures even if the camera-carrying airplane is flying within 100 feet of the ground at 1,000 m.p.h.

The amphibious landing at Inchon, Korea, by the U. S. Marines early last September provided an excellent test of the capabilities of the modern strip camera under combat conditions.

On August 30, 1950, the Photographic Laboratory detachment in Japan was asked by the Intelligence Staff of Amphibious Group One to determine, from aerial photography, the heights of the sea walls at the two invasion beaches at Inchon. Detailed information also was desired regarding enemy shore batteries, trenches, dugouts, and what preparations the North Koreans had made to resist an assault from the sea. The most vital item of intelligence required, however, was the sea wall measurements and their relationship to the tides which are abnormally high at that point, rising and falling as much as 30 feet at an extremely rapid rate.

Natural conditions such as these, if not taken exactly into account, could make the difference between success and failure to an assault force. The delicate job of measuring had to be based on aerial

photography, as we had reason to believe that the enemy would make strenuous objection to a landing party applying the yard stick to his sea walls. Furthermore, the photography had to be done at very high speeds from low altitude if a photo plane was to get back with pictures.

The Eighth Tactical Reconnaissance Squadron of the Fifth Air Force was called on for help. This unit was equipped with RF-80's, the reconnaissance version of the F-80. They were using forward oblique and vertically mounted K-22 Aerial Cameras as well as the new S-11 strip camera containing the automatic film speed synchronizer and stereo (three dimension) lens cones.

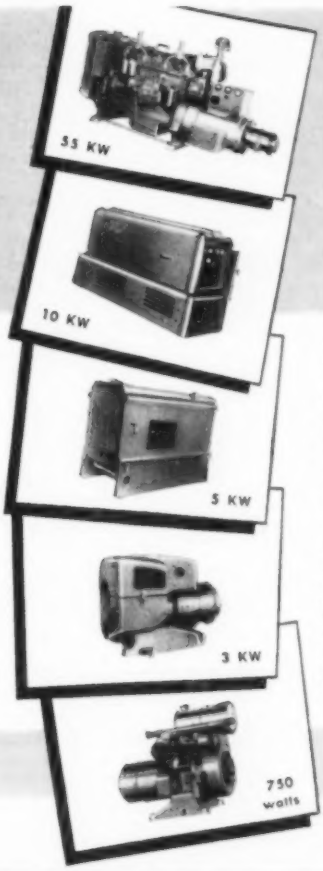
Four missions were flown on August 31 and September 1. They went in fast from the sea at low altitudes, never over 300 feet, directly into the active North Korean shore batteries. Only one minor hit was registered by the enemy on the two aircraft used. Photographically, conditions were almost impossible. Consider such factors as aircraft speeds of around 500 m.p.h., flying altitudes as low as 100 feet from the surface of the sea, and miserable weather. All missions were performed under heavy overcast; two were flown early in the morning in a drizzling rain.

Results, however, were excellent, providing material which was perfect for measurements of ground objects and analysis by intelligence personnel. Some of the vertical K-22 pictures and all of the strip camera photographs were in stereo pairs and adaptable to measurements of sizes of ground objects by proper instruments.

The estimates of wall heights and other pertinent details were turned over to the authorities in charge of the assault. It was found that the strip photography, taken at low altitude, showed measurable details of previously undiscovered trenches, dugouts and gun emplacements. The forward oblique photography provided numerous shots of beach and wall areas, starting from far off-shore, which were of the utmost value to landing boat crews.

After the taking of Inchon, a laboratory representative visited the sea walls and actually measured them with a tape. He found that the measurements taken from the aerial photographs were correct in all cases to within one foot of height in a total of 14 feet over-all, and one measurement missed by only three inches.

Aerial photography in color is an invaluable reinforcement to black-and-white photography. It is being used in Korea to a far greater extent than it was used during any period of World War II. There are several reasons, the primary one being the fact that we have an enemy who makes every use of natural cover and uses deception and concealment as one of his primary weapons. Another factor in the increased use of color is that the USAF has worked out color photography processing kits which can be used successfully by personnel in the field. It no longer is necessary to send color photos back to a base for processing and



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analysis, as advanced field units can do the job in a trifle over an hour. Incidentally, a new process just worked out by the USAF will permit excellent color processing of transparencies in less than 20 minutes and copies in approximately 15.

It is an interesting fact that sometimes color photography from the air will pick up intelligence information which has been missed by black-and-white photography. For example, recently some of our advanced units were being subjected to sporadic but damaging artillery fire from a single point which could not be located by visual reconnaissance nor from careful inspection of black-and-white photos of the area. Color photos, made purely by chance, revealed very clearly that a Red tank had been tumbled, upright, into a ditch by the side of a road by the near-miss of a U. S. bomb. The enemy had covered this tank with rubble, foliage and sticks, allowing only part of the gunbarrel to protude as a fixed-gun position. The tank did not continue in use very long, however, after the picture had been taken.

Many devices other than low altitude night photography, the strip camera and color photography, have been developed in the Photographic Laboratory. For instance, we have the gyro-stabilized camera mount which, regardless of aircraft motion, will hold an aerial camera in a pre-determined position. Another is a huge contrivance which has been adopted as standard for USAF photographic use—the A-7 processor and developing machine. This is a colossus capable of producing 12,000 nine-inch by nine-inch photographic prints within eight hours, requiring the services of only two men. It can be flown to the front in a Fairchild C-82 and be set up and operating within a few hours.

Photographing the Korean war is much different from the job of photographing earlier conflicts. Much has happened since 1918, when Army photographers steamed up to a clearing in some French woods with a Kelly motor truck, unpinned several tent flaps, dragged out bottles and bags and boxes—and set up the Army's first field photographic laboratory. END

Tactical Air Command

(*Continued from page* 46)

which serve the plane, to be located as far forward as possible. It is essential that all components of the tactical air organization, including supporting units, be able to move from site to site rapidly with minimum interruption of operations. In this regard, air transportability is a desirable characteristic.

In order that the tactical air effort may be profitably expended on a wide variety of targets, both in the air and on the ground, or concentrated on a single objective, the air and ground equipment must possess maximum flexibility. There also must be flexibility of control and organization.

Integration of effort is necessary for the respective efforts of ground, sea, and air forces to achieve the maximum effectiveness in battle. The component forces form a team, each augmenting the other. Integration of planning and execution is achieved through a central agency called a Joint Operations Center (JOC). This center operates at Army Group-Tactical Air Command level and at Field Army-Tactical Air Force level. It is the physical location at which Air Force and Army officers sit side by side and determine the feasibility of air strikes requested by front line commanders. The JOC is the nerve center of the Tactical Air Control system.

In order to select the type of airplanes suitable for the tasks of tactical air operations, certain basic characteristics must be met. A decision must be made after careful study as to the best type or types. It was found through the long experience of World War II and later study that three basic capabilities must be possessed by the tactical fighter-bomber.

- The ability to live in the air.
- The ability to strike effectively a variety of targets.
- The ability to fly an effective radius of action.

In considering the order of importance of these fundamentals, it soon became obvious that the ability to live in the air was number one. An airplane that cannot stay in the air against reasonable opposition is worthless. As previously mentioned, the German *Stuka* is a good example. It was completely helpless when confronted by the *Spitfires* and P-40's which shot *Stukas* down like ducks.

Following the war the appearance of the jet made it necessary to re-evaluate our tactical aircraft. Today the jet is to the conventional engine fighters as the Allied fighters were to the *Stuka*. In final analysis, a tactical plane is merely a flying platform to bring weapons into position for accurate fire. The first problem then is to be sure that platform or plane is dependable under all types of combat conditions.

The second fundamental rule is apparent. For even though a plane can live in the air, it still must be able to deliver effective, accurate fire or it might just as well stay on the ground.

The third rule follows naturally—it must be able to reach the target, carry out its assigned mission, and return. In other words, it must have sufficient endurance.

The airplane necessary to do the job of these tactical air requirements must be versatile. To be able to live in the air it must be at least as fast, and preferably faster, than enemy fighters, yet be able to give effective close support to the ground force. It also must be maneuverable, have a rapid rate of climb and fuel capacity sufficient to allow it to remain over the target a reasonable length of time and then return to its base. If it is too heavily loaded with armament it will be slow, unmaneuverable and unable to

live in the air against attacking fighter opposition. Obviously it would be too costly and impractical to have fighter cover for the close support plane. The ideal tactical air support plane then must be both a fighter and a bomber.

At the Air Proving Ground, the USAF conducted exhaustive tactical tests on available modern conventional-engine type planes, including Navy and Marine. Without exception when met by jet opposition all failed to measure up in ability to live in the air against reasonable expected enemy opposition.

The results of these tests left only one alternative: to take the jet airplane which possessed the capability to live in the air and develop it to provide the performance necessary for a typical tactical plane.

The decision to use jets has been proven sound by their combat record in the Far East. Early in the Korean conflict the Air Force annihilated the available enemy air force in less than a week. In this early phase of combat operations the F-80's shot down 40 enemy planes (which compare to F-51 *Mustangs*) without the loss of a single jet.

In addition to possessing reserve speed, the F-80, first USAF operational jet, has proved tougher than the comparable conventional propeller plane. The planes were able to absorb a terrific amount of battle damage and bring their pilots back alive. Flying over half the fighter-bomber sorties in a two month period in Korea, the F-80 losses resulting from ground fire were only one quarter those of the conventional type aircraft. This is remarkable in light of the fact that the F-80 was designed as a defense weapon and was equipped, and the pilots trained, for that mission. Navy experience with the F9F (*Panther*) jet proved similar.

An obvious conclusion as to the reason for the jet's toughness is its structural strength—so designed to resist stress at high speeds. Other reasons are its simpler engine, no delicate ignition system and, of course, the absence of a propeller, a very vulnerable item.

In addition to the F-80 and F-84, other tactical aircraft in use in Korea today include the F-51 and the B-26, both propeller-driven airplanes which were used because they were available in the theater and in large mothballed quantities in this country. They have been successful in the Korean campaign where no enemy air opposition was encountered after the first few days. But they are the last of the World War II type tactical planes. The Republic F-84E is now considered the best aircraft available for fighter-bomber work. Improved types are being tested as future replacements. The Douglas B-26 has been performing in the light bomber role.

Because of its ease of loading and a configuration compatible with all types of loads required in a combat zone, the Fairchild C-119 is serving in the troop carrier capacity. The XC-120, for all practical purposes the same as the C-119 except for a detachable pod, holds great promise for troop carrier and cargo work because of its versatility. Aircraft of the Chase C-123 type and helicopters of the H-19 and H-21 types are being considered for the "short haul" missions.

The Air Force assigned to occupation and defense missions in Japan was not prepared for tactical air warfare in Korea. In spite of this unpreparedness, Army and Marine ground troops from private to general have attested to the effectiveness of air support. Under the pressure of low budget ceilings and high priority items, the military planners were forced to hold Air Force tactical aviation to a secondary position on the military budget. Now that funds are again available, the Air Force can properly develop its tactical power to the high degree reached during World War II operations.

Although much comment has been made about tactical air operations in Korea, the war there is not an ideal gauge of true aerial warfare. Many factors prevent the Korean war from being used as a criterion. Among the most important is the fact that it has been impossible because of political reasons to bomb the source of enemy materiel and manpower, and the fact that enemy air opposition has been negligible. But nothing can be read into the Korean operations to question the Air Force's concept of tactical air power. They do, however, show emphatically that the Air Force's confidence in the capabilities of jet aircraft was well-placed. END

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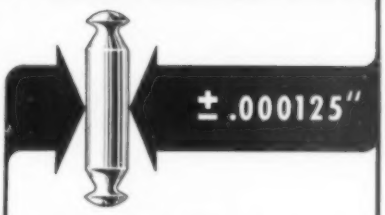

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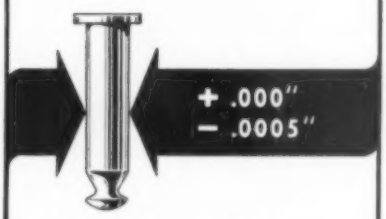

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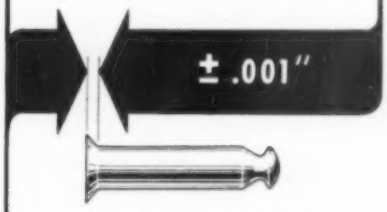

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